Tesoro Refining & Marketing Company LLC

Los Angeles Refinery – Carson and Wilmington Operations

Prevention of Significant Deterioration (PSD) Applicability Evaluation

Integration and Compliance Project

March 2017

Tesoro Refining & Marketing Company LLC - Los Angeles Refinery
Prevention of Significant Deterioration (PSD) Applicability Evaluation
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Executive Summary

In June 2013, the Tesoro Refining & Marketing Company LLC (Tesoro) purchased the BP West Coast Products LLC (BP) Carson Refinery (currently termed the Tesoro Carson Operations) which will be further integrated with the adjacent Tesoro Wilmington Operations to form the Tesoro Los Angeles Refinery (Refinery). The modifications consist of equipment upgrades and streamlining to allow for more efficient operations. The proposed project will have a small impact on crude oil and feedstock throughput capacity. The crude oil and feedstock processing capability at the integrated Refinery will increase by approximately 2% or 6,000 BPD as a result of the proposed project[1]. The type of crude oil and feedstocks will not change as part of the proposed project. The changes proposed as part of this project must be evaluated under South Coast Air Quality Management District (SCAQMD or District) and Federal Prevention of Significant Deterioration (PSD) permitting provisions. As these two facilities are adjacent to each other, they are considered a single stationary source for PSD applicability determination purposes.

Criteria pollutants designated as "attainment" with federal ambient air quality standards are regulated by PSD regulations found in SCAQMD Regulation XVII and Title 40 of the Code of Federal Regulations (CFR) § 52.21. Tesoro wishes to utilize the additional calculation methodologies specified under 40 CFR § 52.21(b)(41) and is submitting this PSD applicability analysis directly to EPA as, when utilizing these additional calculation methodologies, EPA would be the permitting authority if a PSD permit were required.

Relative to the PSD applicability analysis, the Refinery Integration and Compliance Project will emit oxides of nitrogen (NOx), oxides of sulfur (SOx), carbon monoxide (CO), particulate matter, sulfuric acid (H_2SO_4) and volatile organic compound (VOC) emissions. Given the federal attainment status in the SCAQMD, the air pollutants that are considered in this PSD applicability analysis are: NOx (as NO_2), SOx (as SO_2), CO, particulate matter less than 10 microns in diameter (PM-10), particulate matter (PM) and sulfuric acid (H_2SO_4). VOCs (precursor to ozone) and particulate matter less than 2.5 microns in diameter (PM-2.5) are not considered PSD pollutants as the SCAQMD is considered non-attainment for the federal ozone and PM-2.5 standards.

Summary of Analysis

Project emissions are above PSD significance thresholds for all pollutants except CO and H2SO4 under "Step 1" of the PSD applicability analysis; however, through the use of netting as provided under "Step 2," the Project does not trigger the federal PSD permitting provisions of 40 CFR § 52.21. Summaries of Step 1 and Step 2 emissions calculation results are provided in the tables below:

[1] The 6,000 BPD increase is a result of a permit application submitted in early 2014 for the H-100 Heater, before, and independent of the proposed project. As the increase falls within the contemporaneous period as defined by 40 CFR § 52.21, it is included as a contemporary emissions change in this PSD applicability analysis.

40 CFR § 52.21 Significant Emissions Increase Analysis (Step 1)

	NOx	SO_2	CO	PM-10	PM	H_2SO_4
Project Emissions Increase (tpy):	61.7	54.0	94.6	43.8	43.8	3.7
Significance Threshold (tpy):	40	40	100	15	25	7
Exceeds Threshold:	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**No**

40 CFR § 52.21 Significant Net Emissions Increase Evaluation (Step 2)

	NOx	SO_2	CO	PM-10	PM	H_2SO_4
Project Emissions Increase (tpy):	61.7	54.0	94.6	43.8	43.8	3.7
Contemp. Project Emissions (tpy):	(96.1)	(39.9)	(170.7)	(29.1)	(29.1)	0.7
Net Emissions Change (tpy):	**(34.4)**	**14.2**	**(76.1)**	**14.7**	**14.7**	**4.4**
PSD Significance Threshold (tpy):	40	40	100	15	25	7
Exceeds Significance Threshold:	**No**	**No**	**No**	**No**	**No**	**No**

Note: Emissions increases of CO and H2SO4 do not exceed the PSD significance thresholds at Step 1 and are not required to be evaluated under Step 2; however, emissions of CO and H2SO4 are listed here to demonstrate that, including all "contemporaneous" projects, emissions of CO and H2SO4 continue to remain below PSD significance thresholds.

I. INTRODUCTION

In June 2013, the Tesoro Refining & Marketing Company LLC (Tesoro) purchased the BP West Coast Products LLC (BP) Carson Refinery (currently termed the Tesoro Carson Operations), which will be further integrated with the adjacent Tesoro Los Angeles Wilmington Operations to form the Tesoro Los Angeles Refinery (Refinery). The modifications required to further integrate these two refineries – termed the Integration & Compliance Project - must be evaluated under South Coast Air Quality Management District (SCAQMD or District) and Federal Prevention of Significant Deterioration (PSD) permitting provisions. As these two facilities are adjacent to each other they are considered a single stationary source for PSD applicability determination purposes under both District and EPA regulations.

The PSD permitting program is a Clean Air Act permitting program for new and modified major sources of air pollution, including the Refinery. PSD permitting applies to all pollutants emitted by new and modified equipment associated with the Project for which the District does not exceed the National Ambient Air Quality Standards (NAAQS) in an area. The NAAQS establish maximum ambient air pollution concentration levels to protect public health and welfare. Pollutants covered by the NAAQS are NO_2, Ozone, SO_2, PM-10 and PM-2.5, CO, and lead. These pollutants are criteria pollutants. PSD also applies to other regulated air pollutants that do not have a NAAQS. These non-criteria pollutants are listed in EPA's regulations and include fluorides, sulfuric acid mist, hydrogen sulfide (H2S), total reduced sulfur (TRS), reduced sulfur compounds, particulate matter (PM) and certain contaminants from municipal solid waste plants that need not be considered here.

This proposed Project will emit NOx, SOx, CO, PM-10, PM, H_2SO_4 and VOC (precursor to ozone). The SCAQMD achieves the NAAQS for NO_2, SO_2, CO, and PM-10. Therefore, the following attainment air contaminants are considered in this analysis: NOx (as NO_2), SOx (as SO_2), CO, PM-10, as well as PM and H_2SO_4 for which no NAAQS are established. VOC and PM-2.5 are not considered PSD pollutants as the SCAQMD is considered non-attainment for the federal NAAQS applicable to these pollutants. The Project will also include new and modified fugitive emissions sources (fugitive components and storage tanks) which may emit small amounts of H_2S, TRS, and reduced sulfur compounds. Emissions of these attainment air contaminants are expected to be insignificant relative to the 10 tpy PSD significance threshold and are therefore not included in this analysis. Similarly, lead emissions resulting from the combustion of natural gas and refinery fuel gas are expected to be insignificant relative to the significance threshold and are also excluded from this analysis.

The applicable PSD regulations are found in SCAQMD Regulation XVII and Title 40 of the Code of Federal Regulations (CFR) § 52.21. SCAQMD implements Regulation XVII under a partial delegation agreement between the U.S. Environmental Protection Agency (EPA) Region IX and the District. Tesoro wishes to utilize the additional calculation methodologies specified under 40 CFR) § 52.21(b)(41) and is submitting this PSD applicability analysis directly to EPA as, when using these additional calculation methodologies, EPA would be the permitting authority if a PSD permit were required.

While greenhouse gas emissions will be affected as a result of this project, on June 23, 2014 the U.S. Supreme Court issued a decision that EPA may not treat greenhouse gases as an air pollutant for

purposes of determining whether a source is a major source required to obtain a PSD or Title V Permit [see June 24, 2014 memorandum from Janet G. McCabe, Acting Assistant Administrator (Office of Air and Radiation) and Cynthia Giles, Assistant Administrator (Office of Enforcement and Compliance Assurance) to the EPA Regional Administrators]. Notably, the US Supreme Court indicated that EPA could continue to implement limitations on GHG pollutants, based on the application of Best Available Control Technology (BACT), as part of a PSD permit that is otherwise required based on the emissions of conventional pollutants (e.g., NOx, SO_2, CO, PM-10, PM and H_2SO_4). GHG emissions are not included as part of this PSD applicability analysis as the net emissions increases of NOx, SO_2, CO, PM-10, PM and H_2SO_4 are determined to be less than PSD significance thresholds.

This document is organized as follows:

- Section II describes the proposed project and the resulting emissions impacts to the refinery;
- Section III summarizes the Federal PSD applicability analysis PSD performed for this project; and
- Section IV summarizes the pre and post-project recordkeeping and reporting requirements (Reasonable Possibility requirements) applicable to the project.

II. PROJECT DESCRIPTION

The Integration & Compliance Project (Project) is a collection of individual "projects" that will be implemented during the same construction period at the refinery. While it may be appropriate to analyze some of these projects separately, Tesoro has chosen to evaluate all of the changes as a single "project." This was done to assure that the results of the PSD applicability analysis are comprehensive, assuring that any interactions and emissions impacts among project components are considered in the analysis.

The Integration & Compliance Project is intended to meet the following objectives:

- Further integrate the Los Angeles Refinery Wilmington Operations and adjacent Carson Operations;
- Implement changes to comply with the federally mandated Tier 3 gasoline specifications; and
- Implement changes to comply with state and local regulations mandating emission reductions.

The Project includes the shutdown the Wilmington Operation's Fluid Catalytic Cracking Unit (FCCU) and reconfiguration of the combined Refinery complex with flexibility to improve the gasoline to distillate production ratio in order to meet changing market demand. Equipment efficiency and heat recovery will be achieved for new or modified units to minimize greenhouse gases (GHG) and other pollutants. All new and modified sources will meet the District's stringent definition of Best Available Control Technology (BACT) requirements under Regulations XIII and XX (unless determined to be otherwise exempt). The proposed project will have a small impact on crude oil and feedstock throughput capacity. The crude oil and feedstock processing capability at the integrated Refinery will increase by approximately 2% or 6,000 BPD as a result of the proposed project[2]. The type of crude oil and feedstocks will not change as part of the proposed project.

The following tables describe the new, modified and affected emissions sources that are part of the Project and are considered in this PSD permit applicability analysis. The following terms are used in this section and throughout analysis:

New Unit: A new process or emissions unit that will be constructed at the refinery as part of the Project.

Modified Unit: An existing process or emissions unit at the refinery that will realize a physical change or change in the method of operation as part of the Project.

[2] The 6,000 BPD increase is a result of a permit application submitted in early 2014 for the H-100 Heater, before, and independent of the proposed project. As the increase falls within the contemporaneous period as defined by 40 CFR § 52.21, it is included as a contemporary emissions change in this PSD applicability analysis.

Affected Unit: An existing process or emissions unit at the refinery that will not be physically modified but may experience an increase in utilization as a result of the Project.

A. New Units – Carson

Unit	Description	Affected PSD Pollutants	Comments
Wet Jet Treater	Installation of a new treating unit to remove mercaptans and reduce the total acid number (TAN) of jet fuel.	None	VOC emissions are not subject to PSD review. No fired equipment associated with this unit.
Crude Oil Storage Tanks	Installation of new storage tanks to manage crude oil deliveries. No resulting change to crude processing capability.	None	VOC emissions are not subject to PSD review. No fired equipment associated with this unit.

B. New Units – Wilmington

Unit	Description	Affected PSD Pollutants	Comments
Sulfuric Acid Regeneration Plant	Installation of a new unit to regenerate fresh H_2SO_4 from spent H_2SO_4. Includes emissions from process vents and fired heaters.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Crude Oil Storage Tanks	Installation of new storage tanks to manage crude oil deliveries. No resulting change to crude processing capability.	None	VOC emissions are not subject to PSD review. No fired equipment associated with this unit.
Propane Sales and Treating Unit	New unit to treat propane for commercial sale.	None	VOC emissions are not subject to PSD review. No fired equipment associated with this unit.

C. Modified Units – Carson

Unit	Description	Affected PSD Pollutants	Comments
LPG Railcar Unloading Rack	Modifications to allow increased receiving capacity of the rack (propane, propylene, butanes, butylene, etc).	None	VOC emissions are not subject to PSD review. No fired equipment associated with this unit.
Mid Barrel Distillate Treater (C)	Inter-connect piping from Carson LHU and Mid Barrel Distillate Treaters. Fugitive components only; no change to Mid Barrel operations.	None	VOC emissions are not subject to PSD review. No effect to the heater(s) associated with this unit.
Hydrocracker Unit (HCU)	Modifications to allow the processing of distillates recovered from the 51 Vacuum Unit and FFHDS Unit.	None	VOC emissions are not subject to PSD review. See also the "Affected Unit" analysis for HCU heaters.
Light Hydrotreater Unit (LHU)	Modifications to more effectively remove sulfur from FCCU gasoline.	None	VOC emissions are not subject to PSD review. See also the "Affected Unit" analysis for the LHU heater.
Naphtha Hydro-desulfurization Unit (NHDS)	Modifications to allow additional sulfur removal. Includes re-purposing of several vessels from the Iso-Octene Unit for use at the NHDS Unit.	None	VOC emissions are not subject to PSD review. No effect to the heater(s) associated with this unit.
NHDS Heater	Installation of Ultra-Low-NOx burners. No change to the permitted firing rate.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Naphtha Isomerization Unit (Naphtha Isom)	Modifications to allow the recovery of propane and heavier components.	None	VOC emissions are not subject to PSD review. No effect to the heater(s) associated with this unit.

Unit	Description	Affected PSD Pollutants	Comments
Alkylation Unit (Alky)	Modification to enable the processing of amylenes in the Alkylation Unit.	None	VOC emissions are not subject to PSD review. No fired equipment associated with this unit.
51 Vacuum Unit	Modification to increase diesel production by reducing gas oil production.	None	VOC emissions are not subject to PSD review. See evaluation of the 51 Vacuum Unit Heater, below.
51 Vacuum Unit Heater	Increase in permitted firing rate of this heater.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Interconnect Piping	Installation of petroleum piping between Carson and Wilmington.	None	VOC emissions are not subject to PSD review.
Electrical Inter-tie	Installation of electrical tie-ins between Carson and Wilmington.	None	--
Steam System Balance	Electrification of pumps and upgrades to steam system heat exchangers in order to more efficiently utilize existing steam production.	None	See also the "Affected Unit" analysis for Carson Cogeneration Plant.

D. Modified Units – Wilmington

Unit	Description	Affected PSD Pollutants	Comments
FCCU and CO Boiler Shutdown	Shutdown of the existing FCCU Regenerator, CO Boiler, Heaters H2, H3, H4, H5 and the start-up heater.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	This will result in an emission reduction that is creditable for PSD netting purposes
Hydrocracker Unit (HCU)	Modification to the reaction and fractionation sections to accommodate increased ultra-low sulfur diesel production.	None	VOC emissions are not subject to PSD review. See analysis of HCU Heaters (H-300 and H-301), below.

Unit	Description	Affected PSD Pollutants	Comments
Hydrocracker Unit Heater (H-300)	Increase in the permitted firing rate of this heater.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Hydrocracker Unit Heater (H-301)	Increase in the permitted firing of this heater.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Hydrotreating Unit #1 & 2	Modifications to hydrotreat additional FCCU gasoline to comply with the Federally mandated Tier 3 gasoline specifications.	None	VOC emissions are not subject to PSD review. No effect to the heater(s) associated with this unit.
Hydrotreating Unit #4	Modifications to allow the Unit to process either diesel or gas oil.	None	VOC emissions are not subject to PSD review. No effect to the heater(s) associated with this unit.
Catalytic Reforming Unit #3	Modifications to recover propane, which is currently sent to the fuel gas system.	None	VOC emissions are not subject to PSD review. No effect to the heater(s) associated with this unit.
Interconnect Piping	Installation of petroleum piping between Carson and Wilmington.	None	VOC emissions are not subject to PSD review.
Electrical Inter-tie	Installation of electrical tie-ins between Carson and Wilmington.	None	--
Steam System Balance	Electrification of pumps and installation of waste heat steam generators in order to more efficiently produce and utilize steam.	None	See also the "Affected Unit" analysis for the Wilmington Operations.
Storage Tank Modifications	Permit modifications to existing tanks in order to store additional material types or increase the allowable throughputs of the tanks. No change to the overall facility throughput.	None	VOC emissions are not subject to PSD review.

E. Affected Units – Carson

Unit	Description	Affected PSD Pollutants	Comments
Cogeneration Plant	Project will require the production of additional steam. Additional steam production will be provided by the fired units at the cogeneration plant. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
FCCU Regenerator	Project will require increased utilization of this process unit. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
FCCU Pre-Heater	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Hydrocracker Unit Heater (R-1)	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Hydrocracker Unit Heater (R-2)	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Hydrocracker Unit Heater (LHU)	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Storage Tanks	Project will require increased utilization of several storage tanks. No physical modifications are required.	None	VOC emissions are not subject to PSD review.

F. Affected Units – Wilmington

Unit	Description	Affected PSD Pollutants	Comments
H-101 Heater	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
H-30 Heater	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
H-21/22 Heater	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
H-510 Heater	Project will require increased utilization of this heater. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
H-501A, B, 502, 503/504 Heaters	Project will require increased utilization of these heaters. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Boilers 7, 8, 9 and 10	Project will require increased utilization of these boilers. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
SRP Boilers H-1601/1602	Project will require increased utilization of these boilers. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
SRP Incinerators F-704/754	Project will require increased utilization of these incinerators. No physical modifications are required.	NOx, SO_2, CO, PM-10, PM and H_2SO_4	--
Storage Tanks	Project will require increased utilization of several storage tanks. No physical modifications are required.	None	VOC emissions are not subject to PSD review.
Coke Handling	Project may require increased coke handling. No physical modifications are required.	PM-10 and PM	--

G. Units Considered but Not Included in the PSD Applicability Analysis

Sulfur Recovery Units – Carson Operations

The Wilmington Operations SRU will experience a slight increase in utilization as a result of the proposed project. Increases in utilization at the Wilmington Operations SRU have been included in this PSD applicability analysis. Unlike the Wilmington Operations SRU, the Carson Operations SRU will not experience increased utilization as a result of the proposed project. As noted previously in this analysis, the types of crude oil and feedstocks will not change as a result of the proposed project. The proposed project does not include any equipment or operational modifications necessary to change the crude oil blend properties or proportion ranges of different types of crude oil. Additionally, the Carson SRU currently operates at approximately 99% of its capacity[3]. In order to process additional sulfur, significant modifications and/or a new Claus unit and associated incineration equipment would be required to be added at the Carson Operations SRU. No such modifications or new installations are planned as part of the proposed project that would allow an increase in capacity to these units, nor are there plans to make such changes in the foreseeable future. Further, the proposed project will facilitate additional gasoline blendstock hydrotreating in order to decrease gasoline sulfur content, which will increase load to the SRU; however, this increased load to the Carson Operations SRU will be offset by decreased hydrotreating of purchased untreated raw gas oil. Specifically, as part of the proposed project, gasoline blendstock will be treated from current sulfur concentrations (20-30 ppm or 0.002-0.003%) down to EPA Tier III levels (averaging 10 ppm or 0.001%), thus increasing load to the SRU. However, this increase in sulfur load will be offset by replacing the current purchased untreated raw gas-oil feed to the Carson FCCU (containing approximately 2% sulfur) with treated gas-oil feed from Wilmington (containing approximately 0.05% sulfur) which will be available after the proposed project is implemented and the Wilmington FCCU is shutdown. For the reasons stated above, the Carson Operations SRU will remain unchanged with no increases in production or emissions occurring as a result of this project.

Hydrogen Plants – Carson and Wilmington Operations

The Refinery produces hydrogen both in its processing units and its hydrogen plants. The refinery currently uses approximately 100% of the hydrogen produced by the Refinery[4]. The Refinery's hydrogen demand is large (i.e., millions of standard cubic feet per day of hydrogen) and far exceeds the Refinery's capability to produce hydrogen. As such, the Refinery purchases hydrogen from the Air Products Carson and Wilmington Plants. The Refinery currently utilizes all of the contractually available hydrogen produced by Air Products. The Air Products facilities operate at capacity and cannot supply the Refinery with additional hydrogen. The Refinery currently uses all available produced and purchased hydrogen (i.e., the Refinery operates to its hydrogen limit) such that operations are carefully managed based on the available hydrogen. Due to stringent low sulfur, aromatics, and other product specifications that require extensive hydrotreating of process unit feedstocks and products, most California refineries, including the Tesoro, Los Angeles Refinery, limit operations based on hydrogen supply. In order to increase hydrogen consumption, additional hydrogen producing equipment (i.e., a new hydrogen

[3] Capacity is based on 2014 Solomon data; a bi-annual U.S. refinery benchmarking analysis.
[4] Capacity is based on 2014 Solomon data; a bi-annual U.S. refinery benchmarking analysis.

generation plant) would need to permitted and installed at the Refinery or at Air Products. As no modifications to hydrogen producing equipment will be performed, and no new sources of hydrogen producing equipment will be installed, the Refinery will remain hydrogen limited and no increases in Refinery Hydrogen Plant demand, production, or emissions will occur as a result of this project.

Further, while the proposed project includes hydrotreating and hydrocracking process modifications that would require more hydrogen, other proposed project modifications, including the shutdown of the Wilmington Operations FCCU more than offset the increased hydrogen demand. For the same reasons described regarding the Carson Operations SRU, overall hydrogen requirements are expected to decrease slightly after the proposed project is implemented. The project will facilitate additional gasoline blendstock hydrotreating in order to decrease gasoline sulfur content, which will increase hydrogen demand; however, this increase in hydrotreating will be offset by decreased hydrotreating of purchased untreated raw gas oil. Specifically, gasoline blendstock will be treated from current sulfur concentrations (20-30 ppm or 0.002-0.003%) down to EPA Tier III levels (averaging 10 ppm or 0.001%), thus requiring more hydrogen for hydrotreating. This increase in hydrogen demand will be offset by replacing the current purchased untreated raw gas-oil feed to the Carson FCCU (containing approximately 2% sulfur) with treated gas-oil feed from Wilmington (containing approximately 0.05% sulfur) which will be available after the proposed project is implemented and the Wilmington FCCU is shutdown. For the reasons stated above, the Hydrogen Plant operations will not increase as a result of the proposed project.

Flares – Carson and Wilmington Operations

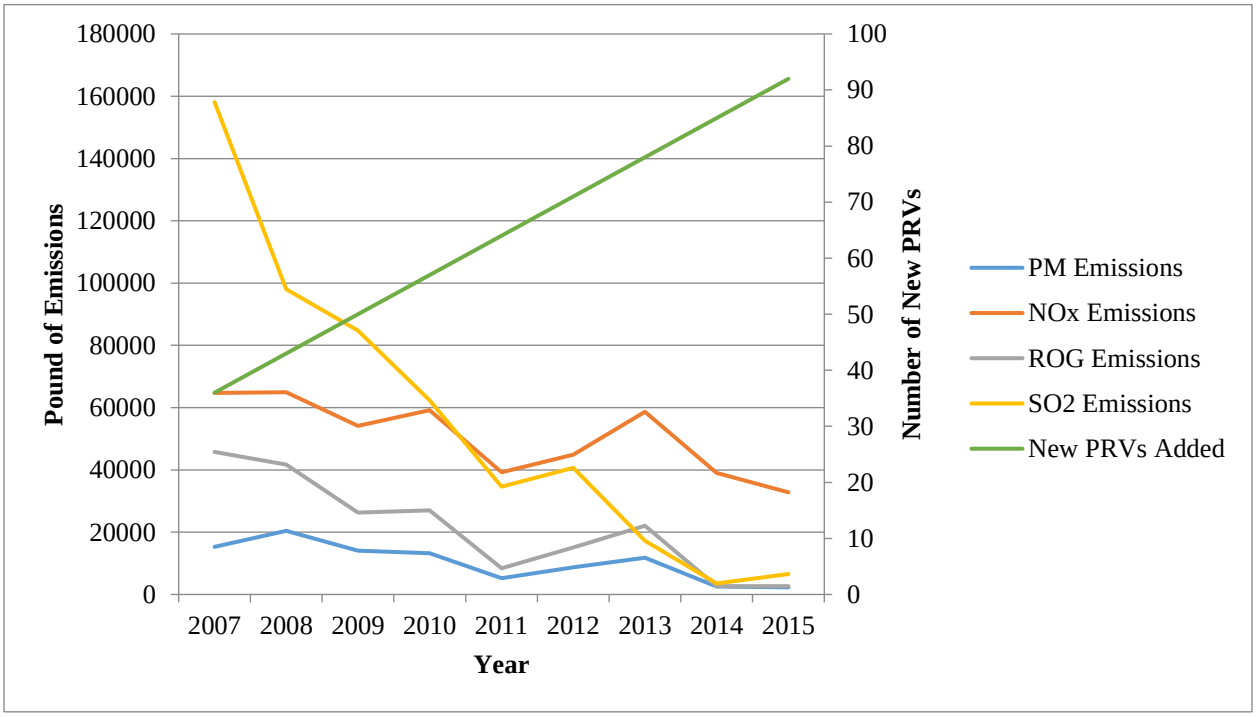
No additional flaring will occur as a result of the proposed project. Currently, applications for 23 new pressure relief valve (PRV) connections to flare have been submitted to SCAQMD, have been evaluated by SCAQMD, and are pending issuance of a permit to construct. It is conservatively estimated that a total of no more than 50 new PRV connections to flare will be installed as part of the proposed project. Additionally, the proposed project includes the shutdown of the Wilmington Operations FCCU, which includes the removal of 44 PRVs from service. However, PRVs are safety devices and are designed to open only when the operating pressure of a refinery process unit exceeds its normal operating pressure. Installation of additional PRVs is a safety measure which allows for a refinery to depressurize from one or more locations within the unit but does not increase hydrocarbon venting since PRVs are normally closed.

The project does not include PRVs which are designed to routinely or continuously vent to flare. Rather, in accordance with SCAQMD Rule 1118, PRVs installed as part of the proposed project will be connected to the Refinery's Flare Gas Recovery System (FGR), not to a flare. FGR recovers hydrocarbons released by PRVs, treats, and uses the recovered hydrocarbons as a fuel instead of combusting them in a flare as a waste, thus enabling the Refinery to reduce natural gas consumption. Combustion of hydrocarbons in the flare is the least desired use of hydrocarbons in the Refinery as these hydrocarbons are not used to produce a saleable product, nor are they used to reduce purchases of natural gas fuel. Further, Rule 1118 allows flaring only during emergencies, shutdowns, startups, turnarounds, or essential operational needs (as defined by the rule). SCAQMD Rule 1118 imposes financial penalties for excess

flaring, which is a financial disincentive for refineries to flare. Therefore, flaring of vent gases is avoided as much as possible, but is the fallback measure to ensure safe destruction of hydrocarbon vent gases.

Tesoro's Flare Gas Vapor Recovery System recovers gases and prevents flaring under most scenarios, including startups and shutdowns. Flaring rarely occurs except during emergencies or process upsets. There are no aspects of the LARIC project that would impact the Flare or the Flare Gas Vapor Recovery System operation. The FGR manages PRV hydrocarbons to its maximum capacity. Only once maximum capacity is exceeded are hydrocarbons directed to the flare. The quantity of hydrocarbons sent to flare as a result of shutdowns, startups and turnarounds are not expected to increase as a result of the proposed project.

Data for the Refinery shows that between 2007 and 2015, approximately 90 PRVs were newly connected to the flare and flare gas recovery system. As shown in the figure below, increasing the quantity of PRVs has no correlation to increased emissions from flares. Increased emissions from flares will not occur as a result of the project.



Source: Emissions data: http://www.aqmd.gov/home/regulations/compliance/r1118/flare-operator-information/tesoro-refinery-carson, years 2007 -2015
http://www.aqmd.gov/home/regulations/compliance/r1118/flare-operator-information/tesoro-wilmington, years 2007 -2015
http://www.aqmd.gov/home/regulations/compliance/r1118/flare-operator-information/tesoro-sulfur-recovery-plant, years 2007 -2014
PRV data: Tesoro permit applications

Cogeneration Plant – Wilmington Operations

The proposed project will result in an overall decrease in steam demand at Wilmington Operations. This decrease in steam demand is the result of physical and operational changes to equipment, including operational efficiency increases associated with heat transfer equipment (e.g., installing heat exchangers for unit pre-heat, to recover heat from other high temperature process streams). Decreases in steam demand will result in emissions decreases from steam generating equipment; however, Tesoro's PSD analysis conservatively excludes these reductions from the analysis. When considering the potential 6,000 barrel/day increase in crude oil capacity associated with the change in the described duty of DCU H-100 heater, increased utilization of downstream processing equipment was included in the PSD analysis. Steam generating equipment associated with the 6,000 barrel/day increase include Wilmington Operation's Boilers, 7, 8, 9 and 10, as well as SRP Boilers H-1601 and H-1602. No additional steam will be required from the Cogeneration Plant to support the crude oil capacity increase. The Cogeneration Plant operations will remain unchanged with no increases in firing rates, nor increases in the hours of operation as a result of the proposed project.

III. PSD APPLICABILITY ANALYSIS

The Tesoro Los Angeles Refinery is a "major stationary source" as defined by 40 CFR § 52.21(b)(1). Major stationary sources must evaluate projects using the two-step PSD applicability analysis as defined in 40 CFR § 52.21(a)(2)(iv)(a):

> "… a project is a major modification for a regulated NSR pollutant if it causes *two types of emissions increases*—a significant emissions increase (as defined in paragraph (b)(40) of this section), and a significant net emissions increase (as defined in paragraphs (b)(3) and (b)(23) of this section). The project is not a major modification if it does not cause a significant emissions increase. If the project causes a significant emissions increase, then the project is a major modification only if it also results in a significant net emissions increase." (*emphasis added)*

Significant Emissions Increase and Significant Net Emissions Increase calculations are described in the paragraphs below.

A. Significant Emissions Increase Analysis (Step 1)

40 CFR § 52.21 significant emissions increase calculation provisions require the calculation of emissions increases for new, modified and affected sources, based on the difference between pre-project baseline emissions and the post-project emissions of the unit. For the Cogeneration Unit, the baseline period is any two-year period within the 5-year period immediately preceding the date when the owner/operator "begins actual construction" [ref. 40 CFR § 52.21(b)(48)(i)]. Notably, for the Cogeneration Unit, the Administrator may allow a different time period if it is determined that it is more representative of normal source operation. For all emitting units other than the Cogeneration Unit, the baseline period is any two-year period within the 10-year period immediately preceding the date of receipt of a completed permit application by the Administrator [ref. 40 CFR § 52.21(b)(48)(ii)].

Pre-project baseline periods can vary by pollutant and can also vary between the Cogeneration Unit and the other emitting units. For the Cogeneration Unit, the period June 2012 through May 2014 was used as the baseline period for pre-project emissions for all pollutants, which falls within the 5-year period immediately preceding the construction start date. For all other emitting units, the 2012 and 2013 calendar years were used as the baseline period for pre-project emissions for all pollutants with the exception of PM-10 and PM which used 2011 and 2012 calendar year emissions for the baseline. Consistent with EPA PSD regulations, reductions in emissions due to physical modification or removal from service (e.g., shutdown of the Wilmington Operation's FCCU) may not be included in this Step 1 calculation. These reductions may only be considered in the Significant Net Emissions Increase Analysis (Step 2), which is further explained below.

Baseline actual emissions are included as **Attachment C** to this analysis. Post project emissions are calculated as follows:

New Units

Post project emissions are based on the proposed potential to emit of the unit, as controlled by BACT (where applicable), assuming continuous operation at maximum capacity, and including emissions occurring during startup, shutdown and commissioning operations where applicable. Proposed potentials to emit for new units are included with **Attachment D** to this analysis. Sulfuric Acid Regeneration Plant (SARP) process vent SO_2, H_2SO_4 and PM-10 emissions calculations are included with **Attachment J** to this analysis. SARP heater H_2SO_4 emissions calculations are included with **Attachment K** to this analysis.

Modified Units

Post project emissions are based on either previously determined potentials to emit (if no change in the potential to emit is requested), or revised calculated potentials to emit where a new potential to emit is proposed to be established[5], assuming continuous operation at maximum capacity, and including emissions occurring during startup, shutdown and commissioning operations where applicable. Post-project potentials to emit for modified units are included with **Attachment D** to this analysis. Modified heater H_2SO_4 emissions calculations are included with **Attachment K** to this analysis.

Affected Sources

Post project emissions from "affected sources" may be based on the potential to emit or the projected actual emissions upon completion of the project. For this analysis, post-project emissions were determined as follows:

1. Carson Heaters (R-1, R-2 and LHU), FCCU Pre-Heater and Cogeneration Plant: Projected Actual Emissions based on engineering estimates of increases in fired duty.
2. Carson FCCU Regenerator: Projected Actual Emissions based on engineering estimates of increases in FCCU Regenerator feed rate.
3. Wilmington Heaters (H-101, H-30, H-21/22, H-510, H-501A, 501B, 502, 503/504) and Boilers (7, 8, 9 and 10): Projected Actual Emissions based on engineering estimates of increases in fired duty.
4. Wilmington Coke Handling: Projected Actual Emissions based on engineering estimates of increases in coke handling.
5. SRP Boilers (H-1601 and H-1602): Projected Actual Emissions based on engineering estimates of increases in fired duty.
6. SRP Incinerators (F-704 and F-754): Projected Actual Emissions based on engineering estimates of increases in sulfur production.

With the exception of the Carson FCCU Regenerator, FCCU pre-heater and Carson Cogeneration Plant, affected source emissions calculations are included with **Attachment D** to this analysis. Affected source

[5] Post-project emissions for modified units may also be based on projected actual emissions [see 40 CFR § 52.21(a)(2)(iv)(c)]; however, Tesoro did not utilize this calculation method as part of the PSD applicability analysis for modified units.

emissions calculations for the Carson FCCU Regenerator and FCCU pre-heater, as well as the Carson Cogeneration Plant are included with **Attachments E and F** to this analysis, respectively. Additionally, affected source heater H_2SO_4 emissions calculations are included with **Attachment K** to this analysis.

Demand Growth Exclusion – Carson FCCU Regenerator and FCCU Pre-Heater

The Carson FCCU Regenerator and FCCU Pre-Heater will not be physically or operationally modified and are considered "affected sources" as increases in utilization will occur as a result of this project. 40 CFR § 52.21(b)(41)(ii)(c) allows stationary sources to exclude from projections, the portion of the emissions increase that an existing unit 1) could have accommodated during the 24-month baseline period and 2) which are unrelated to the project, including any increased utilization due to product demand growth. A summary of how the Demand Growth Exclusion was utilized for the FCCU Regenerator and Pre-Heater is included below.

Could Have Accommodated (Capable of Accommodating) Emissions

Capable of Accommodating (COA) emissions are calculated based on the highest demonstrated average monthly operating level of the FCCU Regenerator and Pre-Heater during the baseline period. The highest demonstrated average monthly operating levels (COA Feed/Firing Rates) of the FCCU Regenerator and Pre-Heater during the baseline period are summarized in the tables below:

FCCU Regenerator COA Feed Rate	mbbls/day	Time Period	Basis
COA Feed Rate	**99.96**	2011-2012	Historical feed rate records.
COA Feed Rate	**100.56**	2012-2013	

FCCU Pre-Heater COA Firing Rate	MMBtu/hr	Time Period	Basis
COA Firing Rate	**65.71**	2011-2012	Historical firing rate records.
COA Firing Rate	**65.71**	2012-2013	

Unrelated to the Project

FCCU operational rates at the refinery vary based on seasonal variations in local and regional demand, availability of FCCU feedstocks, fuel production by other refineries within the Los Angeles/Long Beach area, the quantity of fuels exported out of the area, and the quantity of fuels imported by pipeline, rail and barge. Because the available supply of gasoline produced by local refineries does not meet local and regional demand, Tesoro projects to operate the FCCU Regenerator and associated Pre-Heater at levels meeting or exceeding COA rates irrespective of the proposed project (i.e., the projected operational rates are unrelated to the proposed project). A more detailed explanation of FCCU utilization, supporting project un-relatedness, is included with **Attachment E**.

Emissions Increase

Tesoro concludes that the FCCU Regenerator and Pre-Heater COA operational levels (emissions) meet the criteria for the Demand Growth exclusion as defined by 40 CFR § 52.21(b)(41)(ii)(c) and that Demand Growth emissions from these units can be excluded from this analysis. Tesoro is confident that it is correctly applying Demand Growth Exclusion emissions in the FCCU analysis; however, Tesoro has also prepared an alternate analysis that has conservatively removed the FCCU Demand Growth Exclusion

emissions from this PSD applicability analysis. Regardless, as shown in **Attachments A, B and E**, and as summarized in the tables below, the PSD significance thresholds are not exceeded whether or not Demand Growth Exclusion emissions associated with the FCCU Regenerator and Pre-heater are considered.

40 CFR § 52.21 Significant Net Emissions Increase Evaluation (Step 2) – *Alternate Analysis (Excluding FCCU COA)*

	NOx	SO_2	CO	PM-10	PM	H_2SO_4
FCCU Emissions Increase (tpy):	7.73	33.79	22.34	16.85	16.85	0.57
FCCU Pre-Heater Emissions Increase (tpy):	5.77	2.02	1.12	1.54	1.54	0.12
Total Project Emissions Increase (tpy):	61.7	54.0	94.6	43.8	43.8	3.7
Contemp. Project Emissions (tpy):	(96.1)	(39.9)	(170.7)	(29.1)	(29.1)	0.7
Net Emissions Change (tpy):	**(34.4)**	**14.2**	**(76.1)**	**14.7**	**14.7**	**4.4**
PSD Significance Threshold (tpy):	40	40	100	15	25	7
Exceeds Significance Threshold:	**No**	**No**	**No**	**No**	**No**	**No**

40 CFR § 52.21 Significant Net Emissions Increase Evaluation (Step 2) – *Demand Growth Exclusion Analysis (Including FCCU COA)*

	NOx	SO_2	CO	PM-10	PM	H_2SO_4
FCCU Emissions Increase (tpy):	5.25	2.79	2.26	1.16	1.16	0.06
FCCU Pre-Heater Emissions Increase (tpy):	3.37	1.17	0.29	0.74	0.74	0.05
Total Project Emissions Increase (tpy):	56.8	22.2	73.7	27.3	27.3	3.2
Contemp. Project Emissions (tpy):	(96.1)	(39.9)	(170.7)	(29.1)	(29.1)	0.7
Net Emissions Change (tpy):	**(39.3)**	**(17.7)**	**(97.0)**	**(1.7)**	**(1.7)**	**3.9**
PSD Significance Threshold (tpy):	40	40	100	15	25	7
Exceeds Significance Threshold:	**No**	**No**	**No**	**No**	**No**	**No**

The emissions summarized in the remainder of this document are based on the Alternate Analysis. Detailed emissions increase calculations are included with **Attachment E** to this analysis.

Demand Growth Exclusion – Carson Cogeneration Plant

The Cogeneration Plant will not be physically or operationally modified and is considered an "affected source" as a small increase in utilization will occur as a result of this project. 40 CFR § 52.21(b)(41)(ii)(c) allows stationary sources to exclude from projections, the portion of emissions increases that an existing unit 1) could have accommodated during the 24-month baseline period and 2) which are unrelated to the project, including any increased utilization due to product demand growth. A summary of how the Demand Growth Exclusion was utilized for the Cogeneration Plant is included below.

Could Have Accommodated (Capable of Accommodating) Emissions

Capable of Accommodating (COA) emissions are calculated based on the highest demonstrated average monthly operating level of the Cogeneration Plant during the baseline period. The firing rate of the Cogeneration Units are maintained at a relatively steady state. The highest demonstrated average

monthly operating level (COA Firing Rates) of the Cogeneration Plant during the baseline period is summarized in the table below:

Firing Rate	MMBtu/hr	Time Period	Basis
COA Firing Rate (Actual)	**4,290**	June 2012-May 2004	Historical firing rate records.

Unrelated to the Project

A small increase in steam demand will occur as a result of this project (see Fluor analysis of steam demand associated with this project included with **Attachment F)**. As this small amount of increase in steam demand is related to the project, it has been deducted from the COA firing rate, as shown in the table below. In other words, Tesoro is supporting the Demand Growth "unrelatedness" requirement by identifying and including the portion of the firing rate which has been determined as "related" to the project and, therefore, is not excludable from the projection.

Firing Rate	MMBtu/hr	Time Period	Basis
Conservative Estimate of Project Related Firing Rate Increase	**20**	--	Fluor Analysis of Additional Steam Demand
Excludable COA Firing Rate	**4,270**	June 2012-May 2004	COA Firing Rate (Actual) less the Project Related Firing Rate Increase

The Excludable COA Firing Rate is multiplied by the corresponding pollutants' emission factor to calculate the Excludable COA Emissions.

Emissions Increase

For the Cogeneration Plant, the Demand Growth Exclusion conditions are satisfied and the Demand Growth Exclusion is utilized. Tesoro calculated the emissions increase from the Cogeneration Plant as follows:

Demand Growth Emissions = Excludable COA Emissions – Baseline Emissions

Emissions Increase = Projected Actual Emissions – Baseline Emissions – Demand Growth Emissions

Detailed emissions increase calculations are included with **Attachment F** to this analysis.

Other Considerations (Step 1 Analysis)

1. In order to avoid artificially inflating baseline emissions data, punitive missing data substitutions were excluded from baseline actual emissions calculations (e.g., the max emissions rate of the previous 30 calendar-days as required of missing CEMS data under the SCAQMD RECLAIM program). Because the baseline emissions are not artificially increased using RECLAIM missing data provisions, the estimated project emissions increases are larger.

2. As required by 40 CFR 52.21, actual emissions above permitted levels may not be included in the baseline emissions. As such, concentration/mass emissions exceedances, if any, were excluded from baseline actual emissions data.
3. There are no emissions limitations that recently have been, or presently will be imposed by regulation (e.g., permit, local rule, New Source Performance Standard, Maximum Achievable Control Technology, or Consent Decree) that will affect emissions sources associated with this project. As such, no adjustment to baseline or post project emissions was required as part of this evaluation.

Summary of Step 1 Emissions Calculations

The Significant Emissions Increase analysis is included as **Attachment A** and is summarized in the table below:

40 CFR § 52.21 Significant Emissions Increase Analysis (Step 1)

	NOx	SO_2	CO	PM-10	PM	H_2SO_4
Project Emissions Increase (tpy):	61.7	54.0	94.6	43.8	43.8	3.7
Significance Threshold (tpy):	40	40	100	15	25	7
Exceeds Threshold:	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**No**

Based on this analysis, PSD pollutant emissions resulting from this project exceed significance threshold for all pollutants except CO and H_2SO_4. PSD "netting" calculations, as prescribed in 40 CFR § 52.21 (see Step 2 discussion below), are utilized in order to demonstrate non-applicability of PSD provisions for this project.

B. Significant Net Emissions Increase Analysis (Step 2)

As project emissions exceed significance thresholds for all pollutants except CO and H_2SO_4 at Step 1, analysis under Step 2 is required. Emissions increases of CO and H_2SO_4 do not exceed the PSD significance thresholds at Step 1 and are not required to be evaluated under Step 2; however, emissions of CO and H_2SO_4 are listed here to demonstrate that, including all "contemporaneous" projects, emissions of CO and H_2SO_4 continue to remain below PSD significance thresholds.

40 CFR § 52.21(b)(3) *net* emissions increase calculation provisions are calculated as follows:

Net Emissions Increase = Project Emissions Increases + Contemporaneous Emissions Increases and Decreases

Project Emissions Increases

These emissions are the sum of the emissions increases from a physical change or change in the method of operation associated with the project. These emissions are calculated pursuant to 40 CFR § 52.21(a)(2)(iv) – e.g., Step 1 (see above).

Contemporaneous Emissions Increases and Decreases

These emissions are the sum of the creditable emissions increases and decreases occurring during the period 5 years prior to the current project and up to the commencement of operation of the current

project. Contemporaneous emissions are calculated based on the difference between pre-project baseline emissions and the post-project potential to emit; the pre-project two-year baseline period can vary by pollutant (ref. the April 4, 2011 memo from Cheryl L. Newton, Director of the EPA Air and Radiation Division, to Mr. Keith Baugues, Assistant Commissioner of the Office of Air Quality of Indiana's Department of Environmental Management).

Project construction is anticipated to commence during the first half of 2017 and complete during the second half of 2021. As such, all projects requiring an air permit at Carson and Wilmington Operations that have occurred between 2012 and the date of this analysis have been included in this analysis. Additionally, projects which are not related to the Integration and Compliance Project that have not yet undergone permitting but are presently anticipated to occur between the present date and the second half of 2021, and which affect attainment air contaminant emissions, are also included in this analysis. Emissions increases for these sources are based on the difference between pre-project baseline emissions (two-year period preceding the date of the contemporaneous project) and the post-project potential to emit. Post project emissions are based on the potentials to emit determined at the time of permitting of the contemporaneous project (see summary of Contemporaneous Project emissions included with **Attachment B**).

Reductions in emissions due to physical modification or removal from service (i.e., shutdown of the Wilmington Operation's FCCU - see summary of historic emissions included as **Attachment G**) and reductions in emissions associated with the modification of the H-300 and H-301 heaters (see summary of historic emissions included with **Attachment C**) are allowed to be included in Step 2 calculations. For emissions reduction calculations, the 2012 and 2013 calendar years were used as the baseline period for pre-project emissions for all pollutants with the exception of PM-10 and PM which used 2011 and 2012 calendar year emissions for the baseline. The post-project potential to emit for the Wilmington FCCU and associated heaters are zero for all pollutants as this unit will be shut down as part of the Integration and Compliance Project. The quantity of PM-10 emission reduction credits (ERCs) already applied for by Tesoro, as a result of the shutdown of the CO Boiler at the FCCU, are not considered "creditable" to this PSD analysis and were excluded from the Step 2 analysis [see 40 CFR § 52.21(b)(3)(iii)(a)].

Summary of Step 2 Emissions Calculations

The Signification Net Emissions Increase analysis is included as **Attachment B** to this analysis and is summarized in the table below:

40 CFR § 52.21 Significant Net Emissions Increase Evaluation (Step 2)

	NOx	SO_2	CO	PM-10	PM	H2SO4
Project Emissions Increase (tpy):	61.7	54.0	94.6	43.8	43.8	3.7
Contemp. Project Emissions (tpy):	(96.1)	(39.9)	(170.7)	(29.1)	(29.1)	0.7
Net Emissions Change (tpy):	**(34.4)**	**14.2**	**(76.1)**	**14.7**	**14.7**	**4.4**
PSD Significance Threshold (tpy):	40	40	100	15	25	7
Exceeds Significance Threshold:	**No**	**No**	**No**	**No**	**No**	**No**

Based on this analysis, PSD pollutant emissions resulting from this project are less than significance threshold for all pollutants and PSD permitting is not required for this project.[7]

A consolidated summary of Step 1 and Step 2 emissions calculations is included as **Attachment H** to this analysis.

Other Considerations (Step 2 Analysis)

1. Tesoro prepared a month by month analysis of emissions in accordance with the current construction schedule listed in the California Environmental Quality Act (CEQA) Environmental Impact Report (EIR). This analysis demonstrates that PSD thresholds are not exceeded in any month during the project schedule. The construction schedules are included with **Attachments A and B**, and a monthly summary of emissions is included as **Attachment I** to this analysis. Note that the anticipated start date of the project schedule has already passed; however, the projected sequence of construction events remains unchanged and is maintained in this PSD applicability evaluation to demonstrate that PSD thresholds are not exceeded in any month during the project.
2. There are no emissions limitations that recently have been, or presently will be imposed by regulation (e.g., permit, local rule, New Source Performance Standard, Maximum Achievable Control Technology, or Consent Decree) that will affect emissions sources associated with this project. As such, no adjustment to baseline or post project emissions was required as part of this evaluation.

C. Consent Decree Provisions

Consent Decree - 2016 Consent Decree (Case 5:16-cv-00722)

The Tesoro Los Angeles Refinery is not a Covered Refinery as defined by this consent decree. Therefore, the provisions of this consent decree do not affect this PSD applicability analysis.

Consent Decree - 2001 Consent Decrees (BP Amoco and Equilon Enterprises LLC)

Tesoro Los Angeles Refinery, Carson Operations was previously owned by British Petroleum and is subject to the provisions of the BP Amoco consent decree. The Tesoro Los Angeles Refinery, Wilmington Operations was previously owned by Equilon Enterprises, LLC and is subject to the provisions of the Equilon Enterprises, LLC consent decree. All reductions required by these consent decrees, including subsequent revisions, were achieved prior to the baseline period and therefore do not affect the emissions baselines, projections, or reductions evaluated by this PSD analysis.

[7] Including the FCCU Regenerator and Pre-Heater Demand Growth Exclusion, Net Emissions Increases remain below PSD Significance Thresholds and are as follows: -39.3 tpy (NOx), -17.7 tpy (SO_2), -97.0 tpy (CO), -1.7 tpy (PM-10 and PM) and 3.9 tpy (H2SO4)

IV. REASONABLE POSSIBILITY PROVISIONS [40 CFR § 52.21(R)(6)]

A. Applicability

Reasonable Possibility provisions [40 CFR § 52.21(r)(6)] apply when using projected actual emissions [reference to 40 CFR § 52.21(b)(41)(ii)(a) through (c)] and the calculated emissions of the project result in either:

1. A projected actual emissions increase of at least 50% of the "significant emissions increase" thresholds (reference to Step 1 emissions calculations); or
2. A projected actual emissions increase, not considering capable of accommodating and demand growth exclusions, exceeding 50% of the "significant emissions increase" thresholds (reference to Step 1 emissions calculations).

Projected actual emissions calculations were used to calculate emissions from the following sources:

1. Carson Heaters (R-1, R-2 and LHU), FCCU Pre-Heater and Cogeneration Plant
2. Carson FCCU Regenerator
3. Wilmington Heaters (H-101, H-30, H-21/22, H-510, H-501A, 501B, 502, 503/504) and Boilers (7, 8, 9 and 10)
4. Wilmington Coke Handling
5. SRP Boilers (H-1601 and H-1602)
6. SRP Incinerators (F-704 and F-754)

As project emissions exceed 50% of significant emissions increase thresholds for all PSD pollutants under either applicability provision, the Reasonable Possibility provisions of this section apply to these sources.

B. Pre-Project Requirements [40 CFR § 52.21(r)(6)(i) and (ii)]

Tesoro is required to prepare and provide to the Administrator the following information:

1. A description of the project.
2. Identification of each emissions unit whose emissions of a regulated NSR pollutant could be affected by the project.
3. A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including the baseline actual emissions, the projected actual emissions, any emissions excluded and an explanation of why these can be excluded [capable of accommodating and demand growth emissions – see 40 CFR § 52.21(b)(41)(ii)(c)], and any netting calculations.

This applicability evaluation includes the required pre-project documentation required by 40 CFR § 52.21(r)(6)(i). As this project involves an electric utility steam generating unit [i.e., the Carson Cogeneration Plant; see definition in 40 CFR § 52.21(b)(31)] this evaluation is required to be provided to the Administrator [see 40 CFR § 52.21(r)(6)(ii)]. Project baseline actual emissions and projected emission are documented in **Attachments C, D, E, F, J, K and L** to this analysis. This analysis and submittal, satisfies these requirements.

C. Post-Project Requirements [40 CFR § 52.21(r)(6)(iii)-(v)]

Emissions Monitoring and Records [40 CFR § 52.21(r)(6)(iii) and (v)]

Post-project emissions must be monitored and maintained for a period of 5 years following resumption of regular operations after the change, or for a period of 10 years following resumption of regular operations after the change if the project increases the design capacity or potential to emit of the emissions unit. Tesoro will maintain records of post-project actual emissions according to the provisions of this regulation.

Reporting [40 CFR § 52.21(r)(6)(iv) and (v)]

Existing Electric Utility Steam Generating Units

Electric utility steam generating unit is defined in 40 CFR § 52.21(b)(31) as "any steam electric generating unit that is constructed for the purpose of supplying more than one-third of its potential electric output capacity and more than 25 MW electrical output to any utility power distribution system for sale…." As the Carson Cogeneration Plant meets this definition, Tesoro will submit, within 60 days after the end of each calendar year, a report documenting the Carson Cogeneration Plant's annual emissions [see 40 CFR § 52.21(r)(6)(iv)].

Project Emissions

As required by the regulation, Tesoro must submit a report to the Administrator if the cumulative annual emissions of sources affected by the project (new, modified and affected sources) exceed the baseline actual emissions by a significant amount, and if such emissions differ from the preconstruction projection. Such report shall be submitted to the Administrator within 60 days after the end of such year. The report shall contain the following:

1. The name, address and telephone number of the major stationary source;
2. The annual emissions; and
3. Any other information that the owner or operator wishes to include in the report (e.g., an explanation as to why the emissions differ from the preconstruction projection).

ATTACHMENT A

40 CFR § 52.21 SIGNIFICANT EMISSIONS INCREASE CALCULATIONS (STEP 1)

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment A: PSD Significant Emissions Increase Calculations (Step 1)

New Sources

Project Name	Application #/ Year	Project Description	VOC Only Project?	Emissions Change (Tons Per Year) NOx	SOx	CO	PM-10	TSP	H2SO4	Potential "Affected" Sources?	Additional Comments	Estimated Project Completion Date
Wilmington												
Propane Storage and Treatment Unit (W)	Not yet submitted	Installation of absorbers and dryers to meet propane sales specifications.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Dec 2018
Sulfuric Acid Regeneration Plant - Heaters (W)	Not yet submitted	Regeneration plant to remove impurities and return spent acid as clean fresh acid (400 tpd). Project will include tanks, heaters and other process equipment.	No	3.05	0.17	10.01	2.15	2.15	0.01	None	New potential emissions (heaters). H2SO4 emissions not anticipated from natural gas combustion.	Jun 2018
Sulfuric Acid Regeneration Plant (W) - Process Emissions	Not yet submitted	Regeneration plant to remove impurities and return spent acid as clean fresh acid (400 tpd). Project will include tanks, heaters and other process equipment.	No	-	5.68	-	1.10	1.10	1.10	None	New potential emissions (process vent)	Jun 2018
Crude/Other Tanks (W)	Not yet submitted	Replace Tanks 80035 and 80036 with new tanks (300035 and 300036), modify Tanks 80038 and 80079.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Jun 2018
Carson												
Wet Jet Treater (C)	Not yet submitted	New 50,000 bpd wet jet treater (used to remove mercaptans and total acid number, or organic acid content). New reactor, product seperators, spent caustic loading facilty, pumps, salt dryers, clay filters and piping.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Jul 2018
Crude Tankage (C)	Not yet submitted	Installation of 6 new crude storage tanks (500,000 bbl each). No increase in crude throughput or change in crude types. Will allow for marine vessels to unload with less delay.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Post Jan 2019
		Subtotal:		3.05	5.85	10.01	3.24	3.24	1.10			

Modified Sources

Project Name	Application #/ Year	Project Description	VOC Only Project?	Emissions Change (Tons Per Year) NOx	SOx	CO	PM-10	TSP	H2SO4	Potential "Affected" Sources?	Additional Comments	Estimated Project Completion Date
Wilmington												
FCCU Shutdown (W)	See Step 2	Shutdown the FCCU/COB at the Wilmington Refinery.	No	-	-	-	-	-	-	NA	Emissions decreases not considered in Step 1.	See Step 2
Hydrocracker Unit Mods (W)	575876 / 2015	Modifications to the reaction and fractionation sections to increase the production of ultra-low sulfur diesel and gasoline. Installation of several heat exchangers and pumps.	Yes	-	-	-	-	-	-	HC Unit Heaters	See associated "Heaters" evaluation below.	Mar 2017
Hydrotreating Unit #1 & 2 Mods (W)	Not yet submitted	Modifications to hydrotreat FCCU gasoline in order to comply with Federal Tier 3 standards and to hydrotreat jet components. Modifications to heat exchangers, pumps and repurposing a salt dryer to a feed surge drum.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Apr 2017
Hydrotreating Unit #4 Mods (W)	567619 / 2014	Mods to recover jet fuel and produce ultra low sulfur diesel. Installation of new fractionator nozzles, new surge drum, new salt dryer, new coalescer, new pumps, new heat exchangers.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Sep 2017
Catalytic Reforming Unit #3 Mods (W)	Not yet submitted	Modification to recover hydrocracker propane from the refinery fuel gas system. Installation of one new/larger depropanizer tower, heat exchangers and pumps.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Dec 2018
Carson												
LPG Railcar Load/Unload (C)	567648 / 2014	Modification to allow increased receipts of Alky Unit feedstocks (propane, propylene, butane, butylene, LPG, etc)	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Jul 2017
Mid Barrel Distillate Treater (C)	578248 / 2015	Inter-connect piping from Carson LHU and Mid Barrel Distillate Treater. Fugtive components only; no change to Mid Barrel operations.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	May 2017
Hydrocracker Unit Mods (C)	578249 / 2015	Increase in HCU capacity from 60,000 to 65,000 mbpd. Increased H2 gas usage will be required; however, no net increase overall due to the increased H2 availability from the Wilmington operations (FCCU shutdown). Installation of new heat exchangers, pumps, piping and instrumentation.	Yes	-	-	-	-	-	-	HC R2 Heater	See associated "Heaters" evaluation below.	Feb 2017
Light Hydrotreater Unit Mods (C)	567645 / 2014	Modifications to more effectively remove sulfur compounds. Installation of new stripping steam nozzle on the stabilizer, new heat exchangers, new coalescer, new salt dryer, new condensate pot, as well as associated piping and instrumenation.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Feb 2017

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment A: PSD Significant Emissions Increase Calculations (Step 1)

Project Name	Application #/ Year	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Potential "Affected" Sources?	Additional Comments	Estimated Project Completion Date
Naphtha HDS Mods (C)	567646 / 2014	Modifications to allow increased removal of sulfur from pentanes. Installation of a new reactor, new tower, new air cooler, new accumulator, new heat exchangers, new pumps, piping and instrumenation.	Yes	-	-	-	-	-	-	NHDS Heater	See associated "Heaters" evaluation below.	Jul 2017
Naphtha Isomerization Mods (C)	Not yet submitted	Modifications to recover propane and heavier material from unit off-gas. Installation of a new off-gas treater, sponge tower, flash drums, heat exchanger, pumps and associated piping and instrumentation.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Dec 2018
Alkylation Unit Mods (C)	567647 / 2014	Modfication to separate amylenes. Modifications to re-purpose the depentanizer column, replace existing nozzles on the feed surge drum, installation of new heat exchangers, filter/coalescer, ***new truck loading rack*** , new propylene chiller, new pumps, piping and instrumentation.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Nov 2017
Iso-Octene Unit Mods (C)	575838 / 2014	Removal of several vessels and re-purposing them to the Naphtha HDS (C) unit.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Jul 2017
51 Vacuum Unit Mods (C)	567643 / 2014	Installation of new nozzles on the vacuum tower, new exchangers, coalescers, strainers and pumps.	Yes	-	-	-	-	-	-	51 Vac Heater	See associated "Heaters" evaluation below.	Mar 2018
Miscellaneous												
Interconnection Pipeway (C and W)	575837 (C) and 575874 (W) / 2015	Installation of piping to connect the Carson and Wilmington operations.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Oct 2017
Electrical Intertie	NA	Installation of electrical cables from Carson to Wilmington to allow the Carson Cogeneration units to supply Wilmington. New substations and reformers.	No	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Jan 2019
Steam System Balance (C)	NA	110,000 lb/hr increased steam demand needed. Accomplished by a combination of the installation of new heat exchangers, importing steam from Air Products or Wilmington Operations, generating additional steam from the existing Cogeneration Units, or reducing steam demand on existing steam turbines.	No	-	-	-	-	-	-	Steam Plant	No associated combustion unit or no affect to associated combustion unit.	Apr 2017
Storage Tank Modifications (C & W)	Not yet submitted	Changes in allowable products stored as well as allowable throughputs in order to facilitate transfer of products between Carson and Wilmington. Installation of new pipelines, pumps and instrumenation.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Aug 2017
Heaters												
51 Vacuum Unit Heater (D63) Duty Bump (C)	567649 / 2014	D63: Permit the allowance to fire the heater at the maximum capacity of the unit (360 mmbtu/hr).	No	18.04	0.25	42.75	8.22	8.22	0.01	None	Actual to Potential emissions evaluation.	Feb 2018
NHDS Unit Heater (D1433) ULNB Installation (C)	Not yet submitted	D1433: ULNB installation; no increase in duty.	No	0.18	0.11	1.86	1.06	1.06	0.00	None	Actual to Potential emissions evaluation. Emissions decreases are ignored.	Jul 2017
HC Unit Heater Duty Bump H-300 (W)	Not yet submitted	Increase the maximum rated capacity of the heater. Conversion to ULNB, natural gas and upgreades to the SCR.	No	-	-	13.26	2.30	2.30	-	None	Actual to Potential emissions evaluation. Emissions decreases are ignored.	Jul 2017
HC Unit Heater Duty Bump H-301 (W)	Not yet submitted	Increase the maximum rated capacity of the heater. Conversion to ULNB, natural gas and upgreades to the SCR.	No	NA	NA	NA	NA	NA	NA	None	Combined with H-300 above	Jul 2017
		Subtotal:		18.21	0.36	57.88	11.58	11.58	0.01			

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment A: PSD Significant Emissions Increase Calculations (Step 1)

Project Name	Application #/ Year	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Potential "Affected" Sources?	Additional Comments	Estimated Project Completion Date
Affected Sources				**Emissions Change (Tons Per Year)**								
Project Name	**Application #/ Year**	**Project Description**	**VOC Only Project?**	**NOx**	**SOx**	**CO**	**PM-10**	**TSP**	**H2SO4**	**Potential "Affected" Sources?**	**Additional Comments**	**Estimated Project Completion Date**
WILMINGTON												
H-101 Heater (Increased Utilization)	NA	This heater is expected to fire harder as a result of this project.	No	3.47	1.38	0.80	0.15	0.15	0.22	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
H-30 Heater (Increased Utilization)	NA	This heater is expected to fire harder as a result of this project.	No	1.44	0.46	0.07	0.36	0.36	0.05	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
H-21/22 (Increased Utilization)	NA	This heater is expected to fire harder as a result of this project.	No	2.32	0.24	0.50	0.11	0.11	0.04	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
H-510 (Increased Utilization)	NA	This heater is expected to fire harder as a result of this project.	No	0.09	0.04	0.11	0.03	0.03	0.07	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
H-501A, B, 502, 503/504 (Increased Utilization)	NA	This heater is expected to fire harder as a result of this project.	No	0.23	0.08	0.17	0.11	0.11	0.12	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
Boilers 7 & 8 (Increased Utilization)	NA	These boilers are expected to fire harder as a result of this project.	No	2.19	0.56	0.07	0.35	0.35	0.32	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
Boilers 9 & 10 (Increased Utilization)	NA	These boilers are expected to fire harder as a result of this project.	No	2.19	0.56	0.07	0.35	0.35	0.48	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
SRP Boilers H-1601/1602 (Increased Utilization)	NA	These boilers are expected to fire harder as a result of this project.	No	0.02	0.01	0.00	0.01	0.01	0.06	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
SRP Incinerator F-704 (Increased Sulfur Load)	NA	This incinerator is expected to fire harder as a result of this project.	No	0.04	2.31	0.01	0.00	0.00	0.23	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
SRP Incinerator F-754 (Increased Sulfur Load)	NA	This incinerator is expected to fire harder as a result of this project.	No	0.10	2.31	0.01	0.00	0.00	0.17	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
Coke Handling (Increased Utilization)	NA	Coke handling is expected to increase as a result of this project.	No	-	-	-	0.07	0.07	-	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Sep 2016
Misc Tankage	NA	Increased utilization of several existing storate tanks.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Sep 2016
CARSON												
Carson Steam Plant	NA	This project will require additional steam. It is estimated that the steam plant will fire at an increased rate of approximately 20 mmbtu/hr as a result of this project.	No	7.85	1.19	0.91	6.43	6.43	0.05	None	Evaluated on an actual to *projected actual* basis. Includes "Capable of Accomodating" evaluation of emissions.	Nov 2017
FCCU Regenerator	NA	This unit is expected to fire harder as a result of this project.	No	7.73	33.79	22.34	16.85	16.85	0.57	None	Evaluated on an actual to *projected actual* basis.	Jul 2017
FCCU Pre-Heater	NA	This unit is expected to fire harder as a result of this project.	No	5.77	2.02	1.12	1.54	1.54	0.12	None	Evaluated on an actual to *projected actual* basis.	Jul 2017
HC (C) R-1 Heater	NA	This heater is expected to fire harder as a result of this project.	No	3.29	0.82	0.19	0.98	0.98	0.03	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Feb 2018
HC (C) R-2 Heater	NA	This heater is expected to fire harder as a result of this project.	No	2.63	1.75	0.25	1.31	1.31	0.08	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Feb 2018
LHU (C) Heater	NA	This heater is expected to fire harder as a result of this project.	No	1.10	0.27	0.07	0.34	0.34	0.01	None	Evaluated on an actual to future actual basis. Does NOT include evaluation of "Capable of Accomodating" emissions.	Jun 2017
Sulfur Recovery Plant	NA	Project will result in decreased sulfur processing, resulting in an emissions decrease.	No	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	None	Resulting emissions decreases conservatively excluded from this analysis.	Feb 2018
Misc Tankage	NA	Increased utilization of several existing storate tanks.	Yes	-	-	-	-	-	-	None	No associated combustion unit or no affect to associated combustion unit.	Sep 2016
		Subtotal:		40.44	47.81	26.68	28.99	28.99	2.63			

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment A: PSD Significant Emissions Increase Calculations (Step 1)

Project Name	Application #/ Year	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Potential "Affected" Sources?	Additional Comments	Estimated Project Completion Date

Notes

Estimated project completion date is based on the schedule provided in the Environmental Impact Report.

Emissions Change (Tons Per Year) - Alternate Analysis (Excluding FCCU COA)	NOx	SOx	CO	PM-10	TSP	H2SO4
Emissions Change:	61.7	54.0	94.6	43.8	43.8	3.7
PSD Significance Threshold:	40.0	40.0	100.0	15.0	25.0	7.0
Exceeds Threshold:	**Yes**	**Yes**	No	**Yes**	**Yes**	No

Emissions Change (Tons Per Year) - Demand Growth Analysis (Including FCCU COA)	NOx	SOx	CO	PM-10	TSP	H2SO4
Emissions Change:	56.8	22.2	73.7	27.3	25.7	3.2
PSD Significance Threshold:	40.0	40.0	100.0	15.0	25.0	7.0
Exceeds Threshold:	**Yes**	No	No	**Yes**	**Yes**	No

ATTACHMENT B

40 CFR § 52.21 SIGNIFICANT *NET* EMISSIONS INCREASE CALCULATIONS (STEP 2)

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment B: PSD Significant Net Emissions Increase Calculations (Step 2)

"PROJECT" EMISSIONS REDUCTIONS

Project Name	Application #/ Year Submitted	Project Description	VOC Only Project?	Emissions Change (Tons Per Year) NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
FCCU Shutdown (W)	TBD / 2017	Shutdown the FCCU/associated heaters at the Wilmington Refinery.	No	(81.18)	(69.72)	(55.05)	(30.20)	(30.20)	(0.01)	2012/2013 actual emissions (2011/2012 for PM).	Jul 2017
CO Boiler Shutdown (W)	569408 / 10/1/2014	Shutdown COB at the Wilmington Refinery. Excludes PM ERCs applied for by the facility.	No	(23.32)	(6.27)	(120.11)	(0.21)	(0.21)	(1.23)	2012/2013 actual emissions (2011/2012 for PM). Excludes PM ERCs applied for by the facility.	Contemporaneous Project
Coker Venting (C)	No 2 Coker: 571390 / 2016 No. 1 Coker: 582817 / 2016	Installation of piping, eductors and instrumentation to keep drum cycle times the same while reducing release pressure to 2 psia.	No	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Rule 1114 emissions decrease project. Reductions conservatively excluded from the analysis.	Contemporaneous Project
HC Unit Heater Duty Bump H-300 and H-301 (W)	Not yet submitted	Increase the maximum rated capacity of the heater. Conversion to ULNB, natural gas and upgreades to the SCR.	No	(0.10)	(0.19)	-	-	-	-	Actual to Potential emissions evaluation.	Jul 2017
		Subtotal:		(104.60)	(76.18)	(175.16)	(30.41)	(30.41)	(1.24)		

"CONTEMPORANEOUS EMISSIONS" (LARC 5 YEAR LOOKBACK)

New Sources

Project Name	Application #/ Year Submitted	Project Description	VOC Only Project?	Emissions Change (Tons Per Year) NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Storage Tanks - ETN 10172	553189 / 2013	D599: Permit existing Tank 913 (PO no PC application)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Alky Acid Neutralizing Pits - ETN 10192	553179 / 2013	P09S01: Permit 2 existing acid neutralization pits (PO no PC application)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Alky Acid Neutralizing Pits - ETN 10192	553188 / 2013	P09S01: Permit 1 of the 2 existing acid neutralization pits (PO no PC application)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Fire Training Yard Collection Sump	497452 / 2009	D2902: Install a new fire training yard sump to replace D2749, which was removed	Yes	-	-	-	-	-	-	Installed mid 2011.	Contemporaneous Project
Ammonia Storage Tank PO No PC Application RPV 3037, 3230	553186 / 2013	Application to permit existing anhydrous ammonia tank (PO no PC application)	No	-	-	-	-	-	-	List existing unit in the permit; no change in emissions.	Contemporaneous Project
Groundwater Recovery System Permitting	510406 / 2010	Application to permit existing groundwater extraction/remediation wells and associated fugitive components (PO no PC application)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Butane Metering Skid	553174 / 2013	P21S04: Permit the existing connection of thermal relief valves located in the pressurized tank area to the VRS (PO no PC application)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Butane Metering Skid	553187 / 2013	D2591: Permit the existing connection of thermal relief valves located in the pressurized tank area to the VRS (PO no PC application)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Maintenance Building Sump	528138 / 2011	D2749/C2910: Convert the existing fire training yard sump to the new maintenance building sump and install carbon adsorption	Yes	-	-	-	-	-	-	None	Contemporaneous Project
FCCU Multi Loader (P3, S4)	TBD / 2015	P3S4: Permit the Multi-Loader to inject catalyst into the FCCU Regenerator. This multi-loader will take the place of the existing AutoCat Loader and Shot Pot Loaders which will now only serve as a backup. Application has not yet been submitted (4/10/2014). No change in emissions will occur.	No	-	-	-	-	-	-	Replacement to existing units. Existing units will serve as backup. No change to the emissions rates.	Contemporaneous Project
FCCU AutoCat Loader (P3, S4)	563611 / 2014	P3S4: Permit the existing AutoCat Loader which injects catalyst into the FCCU Regenerator (PO no PC application). Permit application for existing unit that was installed much prior to the PSD 5-year lookback period. No increase in emissions.	No	-	-	-	-	-	-	Permit for existing unit installed prior to PSD 5-year lookback period. No change to emissions rate.	Contemporaneous Project
Remediation - Soil Vapor Extraction	573558 / 2015	Installation of a thermal oxidizer to combust gases extracted from soil.	No	1.28	0.88	0.61	0.05	0.05	-	Conservatively high NOx estimate as PTC has not yet been approved.	Contemporaneous Project
Spent Acid Load Rack	568916 / 2014	Application to permit existing spent acid load rack	Yes	-	-	-	-	-	-	Permit for existing unit installed prior to PSD 5-year lookback period. No change to emissions rate.	Contemporaneous Project
		Subtotal:		1.28	0.88	0.61	0.05	0.05	-		

Modified Sources

Project Name	Application #/ Year Submitted	Project Description	VOC Only Project?	Emissions Change (Tons Per Year) NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment B: PSD Significant Net Emissions Increase Calculations (Step 2)

Project Name	Application #/ Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Storage Tanks - ETN 10172	553185 / 2013	D1081: List Tank No. 44 as fixed roof tank *not* venting to VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Coker Gas Fractionator Dehex Feed Surge Drum Replacement Project	504383 / 2009	P04S07: Installation of a replacement feed surge drum for RPV 1642 (D1981) and connection of PSV located on the new feed surge drum to the #5 flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank Applications - ETN 10198	553184 / 2013	D1128: List Tank 157 as venting to VRS; authorize storage of spent caustic	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Title V Equipment Review Permit Applications (ETN 10236)	553180 / 2013	P11S01: List tank D739 (RPV 2940, gasoline blending unit) as venting to VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
OLD/SR MACT Applicability (2nd Attempt) - ETN 10286	553169 / 2013	P21S04: Connection/removal of VRS connections for BP A/Ns 408305, 415663, and 408330 (Tanks 44, 157, and 913).	Yes	-	-	-	-	-	-	None	Contemporaneous Project
UOP Merox Venting Conditions Permit Application	553173 / 2013	P21S04: Tie in Merox Treating Unit to the VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
UOP Merox Venting Conditions Permit Application	553181 / 2013	P12S08: Tie in Merox Treating Unit to the VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Alkyl Merox Foul Air Connection to Vapor Recovery	543210 / 2012	P09S09: Inactivation of several devices in Iso-Octene unit	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Alkyl Merox Foul Air Connection to Vapor Recovery	553177 / 2013	P09S01: Tie in foul air knock out pot to VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Title V Clean Up Project - Priority 2 Items	553165 / 2013	P09S01: Correct venting conditions of RPV 0211 (D635) to remove requirement to vent to amine system, as tank stores naphtha and is connected to VRS, blanketed with RFG; move to P16S01	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Hydrocracker Optimization Water Wash	501042 / 2009	P08S01: Increase straight run diesel feed rate, and upgrade HCU water wash system.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Hydrocracker PSV Upgrade Project & HP LP Interface Project	502189 / 2009	P08S01: Tie-In of several devices to the HC flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Hydrocracker PSV Upgrade Project & HP LP Interface Project	502190 / 2009	P08S02: Tie-In of several devices to the HC flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Hydrocracker PSV Upgrade Project & HP LP Interface Project	502191 / 2009	P21S03: Tie-In of several devices to the HC flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	501002 / 2009	P06S03: Lube oil reservoir and compressor PRDs connected to vapor control	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	501003 / 2009	P06S01: Lube oil reservoir and compressor PRDs connected to vapor control	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	501004 / 2009	P06S02: Lube oil reservoir and compressor PRDs connected to vapor control	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	501005 / 2009	P21S04: Lube oil reservoir and compressor PRDs connected to vapor control	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	501006 / 2009	P21S11: Lube oil reservoir and compressor PRDs connected to vapor control	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	504559 / 2009	P06S01: CRU #1 Lube oil reservoir connected to VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	504560 / 2009	P06S02: CRU #2 Lube oil reservoir connected to VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Reformer Compressors - Gas Recovery System Permitting	506084 / 2009	P21S04: Lube oil reservoir connected to VRS	Yes	-	-	-	-	-	-	None	Contemporaneous Project
No. 2/3 Naphtha Splitter Feed Surge Drum PSV, 55PSV5008	501926 / 2009	P04S02: Connection of #2/#3 Naphtha Splitter Surge Drum (RPV-1241) at SFIA to coker flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Coker Gas Fractionator Dehex Feed Surge Drum Replacement Project	504384 / 2009	P21S06: Tie-in of PSV associated with replacement to feed surge drum for RPV 1642 (D1981) to the #5 flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
LED Feed Flash Drum Project	511727 / 2010	P21S03: Connect 27PSV5031 on the LED feed flash drum (RPV 3172, D297) to the Hydrocracker Flare (P21S03), install level instrumentation on the LED feed flash drum, and modify instrumentation on the LED tower (RPV 3170, D293) and LED feed flash drum	Yes	-	-	-	-	-	-	None	Contemporaneous Project
LED Feed Flash Drum Project	511728 / 2010	P04S03: Connect 27PSV5031 on the LED feed flash drum (RPV 3172, D297) to the Hydrocracker Flare (P21S03), install level instrumentation on the LED feed flash drum, and modify instrumentation on the LED tower (RPV 3170, D293) and LED feed flash drum	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Ammonia Storage Tank PO No PC Application RPV 3037, 3230	553175 / 2013	D1986: Application to move existing Anhydrous Ammonia Tank from P04S07 to P16S03	No	-	-	-	-	-	-	Administrative change to the permit; no change in emissions.	Contemporaneous Project
SFIA Phase IIA LOM - Batch 1	512088 / 2010	P21S01: Connect PSVs associated with RPV-1073 (D270), RPV-1181 (D272), and RPV-1213 (D282) to the South Area Flare System (P21S01)	Yes	-	-	-	-	-	-	None	Contemporaneous Project

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment B: PSD Significant Net Emissions Increase Calculations (Step 2)

Project Name	Application # / Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
SFIA Phase IIA LOM - Batch 1	512089 / 2010	P04S01: Connect PSVs associated with RPV-1073 (D270), RPV-1181 (D272), and RPV-1213 (D282) to the South Area Flare System (P21S01)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
SFIA Phase IIA LOM - Batch 2	515390 / 2010	P04S01: Connect PSVs associated with D264 and D268 to the South Area Flare System (P21S01)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
SFIA Phase IIA LOM - Batch 2	515465 / 2010	P21S01: Connect PSVs associated with D264 and D268 to the South Area Flare System (P21S01)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 14 Project	513832 / 2010	D1150: Add gas oil and untreated wastewater to the list of allowable materials stored in this tank	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 710 'Change of Permit Condition' Project	519284 / 2011	P12S14: Correct conditions E336.9 and E336.10 to allow venting to the coker low line at pressures <2 psia	Yes	-	-	-	-	-	-	None	Contemporaneous Project
FCCU Start-up/Shutdown Heater	542863 / 2012	D2837: Add a condition indicating the RECLAIM emission factor to use while operating in refractory dry-out mode	No	-	-	-	-	-	-	Administrative change to the permit; no change in emissions.	Contemporaneous Project
#1 Coker Overhead Accumulator New PSV Connection to Flare Project	527741 / 2011	P02S01: Tie in a new PSV from the #1 Coker Overhead Accumulator to the Coker Flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
#1 Coker Overhead Accumulator New PSV Connection to Flare Project	527742 / 2011	P21S01: Tie in a new PSV from the #1 Coker Overhead Accumulator to the Coker Flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Hydrocracker R1 Heater Mass Emissions Limit	553164 / 2013	D625: Change condition to remove mass emissions limit erroneously imposed by Conditions A63.28 and D29.3.	No	-	-	-	-	-	-	Change of condition to remove erroneous liimit placed on the heater. No change in emissions.	Contemporaneous Project
3 Reformer Fractionator - Dehexanizer Mode	535604 / 2012	P06S03: List #3 Reformer Fractionator Column (RPV 2845, D509) in either dehexanizer mode or deisopentanizer mode	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 394 (D1143) Throughput Limit Increase	539146 / 2012	D1143: Increase tank throughput	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 173R (D2612) Throughput Increase	553167 / 2013	D2612: Increase tank throughput	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Mid-Barrel - Connect 19PSV5045 and 19PSV5047 to Flare	553163 / 2013	P05S02: Connect PRDs (19PSV5045 & 19PSV5047) to Flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Mid-Barrel - Connect 19PSV5045 and 19PSV5047 to Flare	553168 / 2013	P21S02: Connect PRDs (19PSV5045 & 19PSV5047) to Flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank Modification (2013; Tanks 33 and 34)	557871 / 2013	D1159: Increase allowable throughput and install secondary seals on Tank 33	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank Modification (2013; Tanks 33 and 34)	557872 / 2013	D1160: Increase allowable throughput and install secondary seals on Tank 34	Yes	-	-	-	-	-	-	None	Contemporaneous Project
FFHDS Amine System PSV Tie-In to Flare (2013)	558541 / 2013	P05S03: Connect PSVs 23PSV5542, 23PSV5543, and 23PSV5544 to the FFHDS Flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
FFHDS Amine System PSV Tie-In to Flare (2013)	558542 / 2013	P21S05: Connect PSVs 23PSV5542, 23PSV5543, and 23PSV5544 to the FFHDS Flare	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 26 - Allow Middle Distillate Storage	561258 / 2013	D1121: Allow middle distillate storage in Tank 26	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Abrasive Blast Cabinet (D2149)	563929 / 2014	D2149: Permit the use of additional blast media. No change to emissions.	No	-			-	-	-	None	Contemporaneous Project
Coker Rule 1114 compliance project and bottoms heads valve project.	571390 / 2015	P2S2: Installation of piping, eductors, and instrumentation to keep drum cycle times the same while reducing the release pressure to 2 psia. Also the installation of remotely operated valves to open the bottoms heads (improves worker safety).	No	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Emissions Decrease	Rule 1114 emissions decrease project. Emissions decrease conservatively excluded from the analysis.	Contemporaneous Project
LPG Recovery Unit PSV Tie-In	568963 / 2014	P10S2: Installation of a new PSV and tie-in to the flare system. No increase in capacity or throughput.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Other Misc storage tanks	TBD / 2015	Miscellaneous storage tank permit applications.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Midbarrel Stabilizer Reboiler Heater #18 NOx Control Research Permit	TBD / 2015	Install new NOx control technology on heater.	No	Emissions Decrease	-	-	-	-	-	NOx reduction project. No change in PTE. Emissions decrease conservatively excluded from the analysis.	Contemporaneous Project
Coke Barn Load Rate Increase	553162 / 2015	Change to permit condition to allow increased loading at the load rack.	No	-	-	-	0.04	0.04	-	None	Contemporaneous Project
Coker blowdown system (basket strainer)	TBD / 2015	List the existing basket strainer in the permit.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank 956	573556 / 2015	Install a steam coil to heat the tank.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Change of Metering Condition on Emergency IC Engines	569765, 569766 569767 / 2014	Change of monitoring condition only; no change in emissions.	No	NA	NA	NA	NA	NA	NA	Change of monitoring condition only; no change in emissions.	Contemporaneous Project

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment B: PSD Significant Net Emissions Increase Calculations (Step 2)

Project Name	Application # / Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Change of condition for #52, Vac, #2 Coker, #2 Reformer, #1 Desulfurizer, HC R2, HC Fractionator Heaters	568900, 568901, 568902, 568903, 568904, 568905, 568906 / 2014	Correction of conditions only. No change in emissions.	No	NA	NA	NA	NA	NA	NA	Correction of conditions only. No change in emissions.	Contemporaneous Project
SRP Incinerator Change of Condition	568897, 568898 / 2014	Change of monitoring condition only; no change in emissions.	No	NA	NA	NA	NA	NA	NA	Change of monitoring condition only; no change in emissions.	Contemporaneous Project
Dehexanizer Unit Mods	TBD / Future Project	Modifications to dehexanizer unit.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank 277	566352 / 2015	Correction of permit to show connection of tank to the vapor recovery system.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Other misc VOC only projects.	TBD / Future Project	Miscellaneous refinery unit permit applications not affecting pollutants other than VOC.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
		Subtotal:		-	-	-	0.04	0.04	-		

"CONTEMPORANEOUS EMISSIONS" (LARW 5 YEAR LOOKBACK)

New Sources

				Emissions Change (Tons Per Year)							
Project Name	Application # / Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Install Eng 80 (at Tk 55000) Firewater ICE - new - JDClarke 575 hp	520668 / 2011	Install Eng 80 (at Tk 55000) Firewater ICE - new - JDClarke 575 hp	No	0.35	0.02	0.07	0.01	0.01	-	Replacement of older firewater pump engines. PTEs of new units conservatively used in the PSD analysis.	Contemporaneous Project
Install Eng 81 (at Tk 55000) Firewater ICE - new - JDClarke 575 hp	520669 / 2011	Install Eng 81 (at Tk 55000) Firewater ICE - new - JDClarke 575 hp	No	0.35	0.02	0.07	0.01	0.01	-	Replacement of older firewater pump engines. PTEs of new units conservatively used in the PSD analysis.	Contemporaneous Project
Install Eng 83 Firewater ICE - new - JDClarke 575 hp	520670 / 2011	Install Eng 83 Firewater ICE - new - JDClarke 575 hp	No	0.35	0.02	0.07	0.01	0.01	-	Replacement of older firewater pump engines. PTEs of new units conservatively used in the PSD analysis.	Contemporaneous Project
DCU - Construct New VAC Tower - identical replacement of existing	526722 / 2011	DCU - Construct New VAC Tower - identical replacement of existing	Yes	-	-	-	-	-	-	Vac Tower replacement only; no installation of new or modification to existing heaters.	Contemporaneous Project
Construct Storage Tank 80009 - stormwater storage tank	535086 / 2012	Construct Storage Tank 80009 - stormwater storage tank	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Demolish Tank 80035 - Construct Tank 300035	545646 / 2012	Demolish Tank 80035 - Construct Tank 300035	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Demolish Tank 80036 - Construct Tank 300036	545745 / 2012	Demolish Tank 80036 - Construct Tank 300036	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Goodway Power Washer. Application cancelled.	549516 / 2013	Goodway Power Washer. Application cancelled.	NA	NA	NA	NA	NA	NA	-	NA	Contemporaneous Project
Karcher Power Washer. Application cancelled.	549518 / 2013	Karcher Power Washer. Application cancelled.	NA	NA	NA	NA	NA	NA	-	NA	Contemporaneous Project
Abrasive Blast Cabinet	TBD / 2013	Permit existing abrasive blast cabinet near machine shop.	No	-	-	-	0.01	0.01	-	None	Contemporaneous Project
		Subtotal:		1.06	0.06	0.22	0.04	0.04	-		

Modified Sources

				Emissions Change (Tons Per Year)							
Project Name	Application # / Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Refinery Flare System	551270 / 2013	Refinery Flare System	Yes	-	-	-	-	-	-	None	Contemporaneous Project
HTU3 Clay filter and particulate filter (Crude Pre-Flash Tower Project)	562262, 562263 / 2014	HTU3 Clay filter and particulate filter (Crude Pre-Flash Tower Project). PRV tie-in to flare.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Water Wash System (DCU)	501288 / 2009	Water Wash System (DCU)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 80075 - convert to internal floater	509883 / 2010	Tank 80075 - convert to internal floater	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 80071 - convert to internal floater	509887 / 2010	Tank 80071 - convert to internal floater	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 80072 (cancel 80085 - replace with 80072) convert from fixed roof to internal floater	515442 / 2010	Tank 80072 (cancel 80085 - replace with 80072) convert from fixed roof to internal floater	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 80045 - Conversion of fixed roof to internal floating roof	518304 / 2011	Tank 80045 - Conversion of fixed roof to internal floating roof	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Caustic Tank - Connect to Vapor Recovery	519203 / 2011	Caustic Tank - Connect to Vapor Recovery	Yes	-	-	-	-	-	-	None	Contemporaneous Project

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment B: PSD Significant Net Emissions Increase Calculations (Step 2)

Project Name	Application # / Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Connect Caustic/Spent Caustic Tank 192 to VR	519205 / 2011	Connect Caustic/Spent Caustic Tank 192 to VR	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Connect Caustic/Spent Caustic Tank 138 to VR	519207 / 2011	Connect Caustic/Spent Caustic Tank 138 to VR	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Connect Caustic/Spent Caustic Tank 139 to VR	519208 / 2011	Connect Caustic/Spent Caustic Tank 139 to VR	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Connect Caustic/Spent Caustic Tank 200A to VR	519209 / 2011	Connect Caustic/Spent Caustic Tank 200A to VR	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Caustic Tank - Connect to Vapor Recovery	519210 / 2011	Caustic Tank - Connect to Vapor Recovery	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Coke Handling - Belt/screen removal and replacement project. No emissions increase.	519994 / 2011	Coke Handling - Belt/screen removal and replacement project. No emissions increase.	No	-	-	-	-	-	-	Belt/screen removal and replacement project. No emissions increase.	Contemporaneous Project
Tank 80009 - Pond 8/9 Stormwater. Application cancelled.	520256 / 2011	Tank 80009 - Pond 8/9 Stormwater. Application cancelled.	NA	NA	NA	NA	NA	NA	-	NA	Contemporaneous Project
DCU Blowdown Project	520770 / 2011	DCU Blowdown Project	Yes	-	-	-	-	-	-	None	Contemporaneous Project
HCOD System - Route DAF Exhaust to Vapor Recovery System	524237 / 2011	HCOD System - Route DAF Exhaust to Vapor Recovery System	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Vapor Recovery System - Alter by addition of DAF	524238 / 2011	Vapor Recovery System - Alter by addition of DAF	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank 80061 (conversion to internal floater)	529876 / 2011	Storage Tank 80061 (conversion to internal floater)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank 80057 (conversion to internal floater)	529905 / 2011	Storage Tank 80057 (conversion to internal floater)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank 80082 (conversion to internal floater)	529992 / 2011	Storage Tank 80082 (conversion to internal floater)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Connect Storage Tank 742 to VR (spent caustic storage tank)	530223 / 2011	Connect Storage Tank 742 to VR (spent caustic storage tank)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
VR System to receive Tank 742	530224 / 2011	VR System to receive Tank 742	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank 80064 - add storage of Transmix	532207 / 2012	Storage Tank 80064 - add storage of Transmix	Yes	-	-	-	-	-	-	None	Contemporaneous Project
FCCU V-410 Identical Replacement	535089 / 2012	FCCU V-410 Identical Replacement	Yes	-	-	-	-	-	-	None	Contemporaneous Project
LAR Admin Change Splitter Tower V-407. Application cancelled.	541993 / 2012	LAR Admin Change Splitter Tower V-407. Application cancelled.	NA	NA	NA	NA	NA	NA	-	NA	Contemporaneous Project
SRP Admin Condition Change for D232.1 - Analyzer Monitoring 60.105(a)(7) to (a)(6) for D51 and D52	542099 / 2012	SRP Admin Condition Change for D232.1 - Analyzer Monitoring 60.105(a)(7) to (a)(6) for D51 and D52	NA	NA	NA	NA	NA	NA	-	NA	Contemporaneous Project
Tank 80072 - Increase Throughput from 500,000 to 600,000 bbl/mo and change product storage slate to same as Tank 80071 (light crude oil 7.5 psia)	544561 / 2012	Tank 80072 - Increase Throughput from 500,000 to 600,000 bbl/mo and change product storage slate to same as Tank 80071 (light crude oil 7.5 psia)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Flare System Refinery - Alkylation Unit Coalescer	551269 / 2013	Flare System Refinery - Alkylation Unit Coalescer	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Two Position Propane Truck Loading (vapor return line)	553835 / 2013	Two Position Propane Truck Loading (vapor return line)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Connect Tank 80038 to vapor recovery and change material stored to HCU charge	554668 / 2013	Connect Tank 80038 to vapor recovery and change material stored to HCU charge	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Vapor recovery system to accept vapors from Tank 80038	554669 / 2013	Vapor recovery system to accept vapors from Tank 80038	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Tank 80079 increase throughput from 350,000 bbl/mo to 500,000 bbl/mo	556835 / 2013	Tank 80079 increase throughput from 350,000 bbl/mo to 500,000 bbl/mo	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Storage Tank - Tank 107 - increase throughput (stripped sour water)	559086 / 2013	Storage Tank - Tank 107 - increase throughput (stripped sour water)	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Other Misc storage tanks	TBD / 2015	Miscellaneous storage tank permit applications.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
SRP Spare Vapor Recovery Compressor C-196	Pending / 2013	SRP Spare Vapor Recovery Compressor C-196	Yes	-	-	-	-	-	-	None	Contemporaneous Project
Acid Rack Vessel Installation	564031 / 2015	Installation of a vessel to collect acid from drain lines.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
FCCU ESP Gas Flow Monitors	562120 / 2014	Change of condition application; no change in emissions.	NA	NA	NA	NA	NA	NA	NA	Change of condition only. No change in emissions.	Contemporaneous Project
Underground Storage Tank Modifications.	565801, 565802 / 2015	Modification to USTs to comply with Rule 461.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
SRP 300 Converter Replacement	TBD / Future Project	Replace converter at SRP 300. No change in emissions.	No	-	-	-	-	-	-	None	Contemporaneous Project
SRP DEA Filtration System	TBD / Future Project	Installation of a DEA filtration system.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
DCU H-100 Heater Duty Bump (W)	567439 / 2014	Increase the maximum rated capacity of the heater. Maintain existing PTEs.	No	6.12	35.38	3.63	1.21	1.21	1.93	Actual to Potential emissions evaluation.	Contemporaneous Project
Heaters H-41, H-42 and H-43	TBD / 2015	Change of condition application; no change in emissions.	NA	NA	NA	NA	NA	NA	NA	Change of condition only. No change in emissions.	Contemporaneous Project

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment B: PSD Significant Net Emissions Increase Calculations (Step 2)

Project Name	Application #/ Year Submitted	Project Description	VOC Only Project?	NOx	SOx	CO	PM-10	TSP	H2SO4	Additional Comments	Estimated Project Completion Date
Other misc VOC only projects.	TBD / Future Project	Miscellaneous refinery unit permit applications not affecting pollutants other than VOC.	Yes	-	-	-	-	-	-	None	Contemporaneous Project
		Subtotal:		6.12	35.38	3.63	1.21	1.21	1.93		

Notes

1) Estimated project completion date is based on the schedule provided in the Environmental Impact Report.
2) Several permit applications for "contemporaneous projects" were submitted before the contemporaneous period. These projects were included in the analysis as SCAQMD permits to construct and actual construction may have occurred during the contemporaneous period.

	Emissions Change (Tons Per Year) - Alternate Analysis (Excluding FCCU/Pre-Heater COA)					
	NOx	SOx	CO	PM-10	TSP	H2SO4
Project Emissions Increases (Step 1):	61.7	54.0	94.6	43.8	43.8	3.7
ntemporaneous Project Emissions and Emissions Decreases (Step 2):	(96.1)	(39.9)	(170.7)	(29.1)	(29.1)	0.7
Total Emissions:	**(34.4)**	**14.2**	**(76.1)**	**14.7**	**14.7**	**4.4**
PSD Threshold:	40.0	40.0	100.0	15.0	25.0	7.0
Exceeds Threshold:	No	No	No	No	No	No

	Emissions Change (Tons Per Year) - Demand Growth Analysis (Including FCCU/Pre-Heater COA)					
	NOx	SOx	CO	PM-10	TSP	H2SO4
Project Emissions Increases (Step 1):	56.8	22.2	73.7	27.3	27.3	3.2
Contemporaneous Project Emissions and Emissions Decreases (Step 2):	(96.1)	(39.9)	(170.7)	(29.1)	(29.1)	0.7
Total Emissions:	**(39.3)**	**(17.7)**	**(97.0)**	**(1.7)**	**(1.7)**	**3.9**
PSD Threshold:	40.0	40.0	100.0	15.0	25.0	7.0
Exceeds Threshold:	No	No	No	No	No	No

ATTACHMENT C

SUMMARY OF BASELINE EMISSIONS AND EMISSION FACTORS

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment C: Summary of Baseline Emissions and Emissions Factors
Facility: Carson

Carson 51 Vacuum Unit Heater (D63) - Duty Bump to 360 MMBtu/Hr

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	7,762.00	8,535.00	lbs/year	22.32	lbs/day	2012/2013 RECLAIM data.
SOx	1,159.00	1,438.00	lbs/year	3.56	lbs/day	2012/2013 AER
CO	5,568.00	3,739.00	lbs/year	12.75	lbs/day	2012/2013 AER
PM	2,759.00	3,066.00	lbs/year	7.98	lbs/day	2011/2012 AER
VOC	5,080.00	6,951.00	lbs/year	16.48	lbs/day	2012/2013 AER
CO2	101,609.00	113,759.78	MT/Yr	650,419.62	lbs/day	2012/2013 GHG Data
CH4	1.92	2.14	MT/Yr	12.26	lbs/day	2012/2013 GHG Data
N2O	0.19	0.21	MT/Yr	1.23	lbs/day	2012/2013 GHG Data
CO2e	101,714.12	113,877.15	MT/Yr	651,091.54	lbs/day	
H2SO4	See "Source" note		lbs/year	0.15	lbs/day	See Attachment K for calculations.

Emission Factors

See Heater PTE calculations

Carson NHDS Ultra-Low NOx Burner Installation (RW0053; D1433)

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	1,694.00	1,400.00	lbs/year	4.24	lbs/day	2012/2013 RECLAIM data.
SOx	25.00	18.00	lbs/year	0.06	lbs/day	2012/2013 AER
CO	15.00	4.00	lbs/year	0.03	lbs/day	2012/2013 AER
PM	50.00	77.00	lbs/year	0.17	lbs/day	2011/2012 AER
VOC	73.00	53.00	lbs/year	0.17	lbs/day	2012/2013 AER
CO2	2,204.36	1,605.91	MT/Yr	11,507.12	lbs/day	2012/2013 GHG Data
CH4	0.04	0.03	MT/Yr	0.21	lbs/day	2012/2013 GHG Data
N2O	-	-	MT/Yr	-	lbs/day	2012/2013 GHG Data
CO2e	2,205.36	1,606.66	MT/Yr	11,512.40	lbs/day	2012/2013 GHG Data
H2SO4	See "Source" note		lbs/year	0.002	lbs/day	See Attachment K for calculations.

Emission Factors

See Heater PTE calculations

Carson HC R-1 Heater (D625) - Affected Unit; No Physical Change

Emission Factors

39	mmbtu/hr rating
1350	mmbtu/mmscf

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	11,868.00	9,488.00	lbs/year	29.25	lbs/day	2012/2013 RECLAIM data.
SOx	1,639.00	4,276.83	lbs/year	8.10	lbs/day	2012: RECLAIM data. 2013: PTE as "actuals" exceed PTE.
CO	94.00	-	lbs/year	0.13	lbs/day	2012/2013 AER
PM	732.00	1,130.00	lbs/year	2.55	lbs/day	2011/2012 AER
VOC	666.00	504.00	lbs/year	1.60	lbs/day	2012/2013 AER
H2SO4	47.80000	1.87E+02	lbs/year	0.32	lbs/day	2012/2013 TRI

EF lbs/day	EF lbs/mmbtu	Basis
46.80	0.05	AN 243865 (1991)
11.72	0.0125	AN 243865 (1991)
2.70	0.00	Permit Condition
14.00	0.01	Permit Condition
4.60	0.00	Permit Condition

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment C: Summary of Baseline Emissions and Emissions Factors
Facility: Carson

Carson HC R-2 Heater (D627) - Affected Unit; No Physical Change

Emission Factors

39	mmbtu/hr rating
1350	mmbtu/mmscf

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source	EF lbs/day	EF lbs/mmbtu	Basis
NOx	8,436.00	7,119.00	lbs/year	21.31	lbs/day	2012/2013 RECLAIM data.	28.08	0.03	R1109 (0.03 lbs/mmbtu) - estimate
SOx	1,212.00	4,190.00	lbs/year	7.40	lbs/day	2012/2013 RECLAIM data.	18.71	0.02	NSPS J limit
CO	629.00	491.00	lbs/year	1.53	lbs/day	2012/2013 AER	2.70	0.00	permit condition
PM	327.00	616.00	lbs/year	1.29	lbs/day	2011/2012 AER	14.00	0.01	permit condition
VOC	256.00	199.00	lbs/year	0.62	lbs/day	2012/2013 AER	4.60	0.00	permit condition
H2SO4	2.67E+01	1.33E+02	lbs/year	0.22	lbs/day	2012/2013 TRI			

Carson LHU Heater (D425) - Affected Unit; No Physical Change

Emission Factors

22	mmbtu/hr rating
1350	mmbtu/mmscf

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source	EF lbs/day	EF lbs/mmbtu	Basis
NOx	3,609.00	2,845.00	lbs/year	8.84	lbs/day	2012/2013 RECLAIM data.	26.40	0.05	AN 233118 (1990)
SOx	485.00	685.00	lbs/year	1.60	lbs/day	2012/2013 RECLAIM data.	6.61	0.01	AN 233118 (1990)
CO	585.30	200.00	lbs/year	1.08	lbs/day	2012: PTE as "actuals" exceed PTE. 2013: RECLAIM data.	1.60	0.00	AN 233118 (1990)
PM	190.00	256.00	lbs/year	0.61	lbs/day	2011/2012 AER	8.21	0.02	AN 233118 (1990)
VOC	165.00	127.00	lbs/year	0.40	lbs/day	2012/2013 AER	2.74	0.01	AN 233118 (1990)
H2SO4	1.49E+01	1.70E+01	lbs/year	0.04	lbs/day	2012/2013 TRI			

Carson FCCU (Process 3, System 1)

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	17,056.75	26,677.73	lbs/year	59.91	lbs/day	2012/2013 RECLAIM data.
SOx	277,265.87	251,717.07	lbs/year	724.63	lbs/day	2012/2013 RECLAIM data.
CO	164,437.38	225,167.79	lbs/year	533.71	lbs/day	2012/2013 AER,
PM	56,940.00	62,717.76	lbs/year	163.91	lbs/day	2011/2012 AER.
VOC	6,939.36	6,195.12	lbs/year	17.99	lbs/day	2012/2013 AER.
H2SO4	5,642.80	4,254.10	lbs/year	13.56	lbs/day	2012/2013 TRI

Emission Factors

See FCCU emissions calculations

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment C: Summary of Baseline Emissions and Emissions Factors
Facility: Carson

Carson FCCU Pre-Heater (D250)

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	16,429.54	12,038.28	lbs/year	39.00	lbs/day	2012/2013 RECLAIM data.
SOx	3,091.55	3,629.06	lbs/year	9.21	lbs/day	2012/2013 RECLAIM data.
CO	-	-	lbs/year	-	lbs/day	2012/2013 AER,
PM	2,391.00	2,761.00	lbs/year	7.06	lbs/day	2011/2012 AER.
VOC	1,120.00	741.70	lbs/year	2.55	lbs/day	2012/2013 AER.
H2SO4	164.1	171.3	lbs/year	0.46	lbs/day	2012/2013 TRI

Emission Factors

See FCCU emissions calculations

Carson Cogeneration Unit

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	410,915.12	420,150.45	lbs/year	1,138.45	lbs/day	June 2012 to May 2014 RECLAIM Data
SOx	79,836.02	46,534.40	lbs/year	173.11	lbs/day	June 2012 to May 2014 RECLAIM Data
CO	48,070.02	47,981.45	lbs/year	131.58	lbs/day	June 2012 to May 2014 Emissions Data
PM	197,109.66	154,091.29	lbs/year	481.10	lbs/day	June 2012 to May 2014 Emissions Data
VOC	145,950.41	130,573.11	lbs/year	378.80	lbs/day	June 2012 to May 2014 Emissions Data (in 2013, used PTE as reported emissions exceeded PTE)
H2SO4	3,107.39	1,812.59	lbs/year	6.74	lbs/day	June 2012 to May 2014 Emissions Data

Emission Factors

See Cogeneration emissions calculations

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment C: Summary of Baseline Emissions and Emissions Factors
Facility: Wilmington

Wilmington H-101 Heater (D32)

Emission Factors

218.4	mmbtu/hr rating

	Year 1	Year 2	Units	Average	Units	Source
NOx	83,250.00	96,095.00	lbs/year	245.68	lbs/day	RECLAIM Data
SOx	12,159.00	15,109.00	lbs/year	37.35	lbs/day	RECLAIM Data
CO	87.00	90.00	lbs/year	0.24	lbs/day	2012/2013 AER
PM	6,130.35	6,475.30	lbs/year	17.27	lbs/day	2011/2012 AER
VOC	4,447.00	4,610.00	lbs/year	12.41	lbs/day	2012/2013 AER
H2SO4	183.44	224.61	lbs/year	0.56	lbs/day	2012/2013 TRI

EF lbs/day	EF lbs/mmbtu	Basis
592.8	0.113	AN 509460
237	0.045	permit condition
136	0.026	permit condition
26	0.005	permit condition
26	0.005	permit condition

Wilmington H-30 Heater (D157)

Emission Factors

48.6	mmbtu/hr rating
1050	mmbtu/mmscf

	Year 1	Year 2	Units	Average	Units	Source
NOx	13,293.00	16,986.00	lbs/year	41.48	lbs/day	RECLAIM Data
SOx	1,503.00	2,213.00	lbs/year	5.09	lbs/day	RECLAIM Data
CO	4,835.00	5,778.00	lbs/year	14.54	lbs/day	2012/2013 AER
PM	1,098.83	1,036.05	lbs/year	2.92	lbs/day	2011/2012 AER
VOC	967.00	1,156.00	lbs/year	2.91	lbs/day	2012/2013 AER
H2SO4	0.83	1.20	lbs/year	0.00	lbs/day	2012/2013 TRI

EF lbs/mmscf	EF lbs/mmbtu	lbs/day	Basis
	0.080	93.31	AN 158019
27	0.026	29.99	AN 158019
4.1	0.004	4.55	AN 158019
21	0.020	23.33	AN 158019
17	0.016	18.88	AN 158019

Wilmington H-21/H-22 Heater (D158)

Emission Factors

203.8	mmbtu/hr rating

	Year 1	Year 2	Units	Average	Units	Source
NOx	15,599.00	17,841.00	lbs/year	45.81	lbs/day	RECLAIM Data
SOx	1,335.00	1,781.00	lbs/year	4.27	lbs/day	RECLAIM Data
CO	4,232.00	4,754.00	lbs/year	12.31	lbs/day	2012/2013 AER
PM	940.35	906.98	lbs/year	2.53	lbs/day	2011/2012 AER
VOC	846.00	951.00	lbs/year	2.46	lbs/day	2012/2013 AER
H2SO4	0.03	0.04	lbs/year	0.00	lbs/day	2012/2013 TRI

EF lbs/hr	EF lbs/mmbtu	Basis
26.28	0.129	AN 333969
2.75	0.013	AN 333969
5.72	0.028	AN 333969
1.22	0.006	AN 333969
1.27	0.006	AN 333969

Wilmington H-510 Heater (D218)

Emission Factors

69	mmbtu/hr rating
1350	mmbtu/mmscf

	Year 1	Year 2	Units	Average	Units	Source
NOx	11,909.00	13,336.00	lbs/year	34.58	lbs/day	RECLAIM Data
SOx	3,032.00	4,535.00	lbs/year	10.37	lbs/day	RECLAIM Data
CO	9,747.00	11,743.00	lbs/year	29.44	lbs/day	2012/2013 AER
PM	2,275.13	2,088.60	lbs/year	5.98	lbs/day	2011/2012 AER
VOC	1,949.00	2,349.00	lbs/year	5.89	lbs/day	2012/2013 AER
H2SO4	1.03	1.52	lbs/year	0.00	lbs/day	2012/2013 TRI

EF lbs/mmscf	EF lbs/mmbtu	lbs/day	Basis
	0.050	82.8	AN 345953
34	0.025	41.78	AN 345953
84	0.062	104.4	AN 345953
21	0.016	25.68	AN 345953
7	0.005	8.72	AN 345953

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment C: Summary of Baseline Emissions and Emissions Factors
Facility: Wilmington

Wilmington H-501A, H-501B, H-502, H-503/504 Heater (D216, D217, D214 and D215)

Emission Factors	2013	2012	
Fuel Usage:	789	630	mmscf
HHV:	1230	1185	mmbtu/mmscf

	Year 1	Year 2	Units	Average	Units	Source	EF (lbs/mmbtu)*	Basis
NOx	29,091.00	32,203.00	lbs/year	83.96	lbs/day	RECLAIM Data	3.32E-02	For all pollutants except PM, EF is
SOx	6,915.00	10,465.00	lbs/year	23.81	lbs/day	RECLAIM Data	1.08E-02	estimated based on 2013 emissions divided
CO	19,149.00	23,992.00	lbs/year	59.10	lbs/day	2012/2013 AER	2.47E-02	by 2013 fuel combusted and 2013 fuel HHV.
PM	10,334.68	11,489.56	lbs/year	29.90	lbs/day	2011/2012 AER	1.54E-02	PM EF is estimated similarly using 2012
VOC	3,553.00	4,451.00	lbs/year	10.96	lbs/day	2012/2013 AER	4.59E-03	data.
H2SO4	108.00	162.00	lbs/year	0.37	lbs/day	2012/2013 TRI	1.67E-04	

Wilmington SRP H-1601/H-1602 Boilers (D76 and D77)

Emission Factors	
112.4	mmbtu/hr rating
1150	mmbtu/mmscf

	Year 1	Year 2	Units	Average	Units	Source	EF lbs/mmscf	EF lbs/mmbtu	EF lbs/hr	Basis
NOx	51,181.00	56,763.00	lbs/year	147.87	lbs/day	RECLAIM Data		0.036	4.08	AN 2759773
SOx	2,270.80	5,656.28	lbs/year	10.86	lbs/day	RECLAIM Data	16.90	0.015		AN 2759773
CO	69,714.00	62,274.00	lbs/year	180.81	lbs/day	2012/2013 AER	4.10	0.004		AN 2759773
PM	7,022.63	6,307.47	lbs/year	18.26	lbs/day	2011/2012 AER	21.00	0.018		AN 2759773
VOC	4,565.00	4,077.00	lbs/year	11.84	lbs/day	2012/2013 AER	7.00	0.006		AN 2759773
H2SO4	11.12	69.23	lbs/year	0.11	lbs/day	2012/2013 TRI				

Wilmington SRP Incinerators F-704 (C56)

	Year 1	Year 2	Units	Average	Units	Source
NOx	7,222.00	5,047.00	lbs/year	16.81	lbs/day	RECLAIM Data
SOx	10,802.00	3,556.00	lbs/year	19.67	lbs/day	RECLAIM Data
CO	1,684.90	1,095.50	lbs/year	3.81	lbs/day	2012/2013 AER
PM	249.98	361.05	lbs/year	0.84	lbs/day	2011/2012 AER
VOC	336.98	219.10	lbs/year	0.76	lbs/day	2012/2013 AER
H2SO4	2.20	3.15	lbs/year	0.01	lbs/day	2012/2013 TRI

Emission Factors		
SRP Conversion Efficiency:	99.9%	Elemental Sulfur Produced/Sulfur Introduced to SRP
SO2 EF	4.221	lbs SO2 emitted /LT S produced
SO2 Emissions EF:	12.66	lbs/day

* SOx emissions increases estimated based on SRP conversion efficiency. Other criteria pollutant emissions increases estimated based on historic emissions data multiplied by the estimated % sulfur loading increase.
** EF estimated based on an ultra conservative 99.9% conversion efficiency from sulfur compounds to elemental sulfur.

Wilmington SRP Incinerators F-754 (C54)

	Year 1	Year 2	Units	Average	Units	Source
NOx	13,354.00	13,170.00	lbs/year	36.33	lbs/day	RECLAIM Data
SOx	5,160.00	3,325.00	lbs/year	11.62	lbs/day	RECLAIM Data
CO	305.25	1,388.10	lbs/year	2.32	lbs/day	2012/2013 AER
PM	375.45	305.25	lbs/year	0.93	lbs/day	2011/2012 AER
VOC	284.90	277.62	lbs/year	0.77	lbs/day	2012/2013 AER
H2SO4	2.07	8.77	lbs/year	0.01	lbs/day	2012/2013 TRI

Emission Factors		
SRP Conversion Efficiency:	99.9%	Elemental Sulfur Produced/Sulfur Introduced to SRP
SO2 EF	4.221	lbs SO2 emitted /LT S produced
SO2 Emissions EF:	12.66	lbs/day

* SOx emissions increases estimated based on SRP conversion efficiency. Other criteria pollutant emissions increases estimated based on historic emissions data multiplied by the estimated % sulfur loading increase.
** EF estimated based on an ultra conservative 99.9% conversion efficiency from sulfur compounds to elemental sulfur.

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment C: Summary of Baseline Emissions and Emissions Factors
Facility: Wilmington

Wilmington Boilers 7 and 8 (D722 and D723)

	2013	2012	
Fuel Usage:	897.37	305	mmscf
HHV:	1228	1185	mmbtu/mmscf

Emission Factors

1330	mmbtu/mmscf

	Year 1	Year 2	Units	Average	Units	Source
NOx	45,447.00	128,209.00	lbs/year	237.88	lbs/day	RECLAIM Data
SOx	18,880.00	32,372.00	lbs/year	70.21	lbs/day	RECLAIM Data
CO	25,617.48	75,379.08	lbs/year	138.35	lbs/day	2012/2013 AER
PM	2,879.49	2,317.77	lbs/year	7.12	lbs/day	2011/2012 AER
VOC	1,677.34	4,836.54	lbs/year	8.92	lbs/day	2012/2013 AER
H2SO4	288.00	505.00	lbs/year	1.09	lbs/day	2012/2013 TRI

EF lbs/mmscf	EF lbs/mmbtu	Basis
133	0.100	ANs 254766, 131774, 131776 and 131775
34	0.026	ANs 254766, 131774, 131776 and 131775
4.1	0.003	ANs 254766, 131774, 131776 and 131775
21	0.016	ANs 254766, 131774, 131776 and 131775
7	0.005	ANs 254766, 131774, 131776 and 131775

Wilmington Boilers 9 and 10 (D724 and D725)

	2013	2012	
Fuel Usage:	686.28	848	mmscf
HHV:	1228	1185	mmbtu/mmscf

Emission Factors

1330	mmbtu/mmscf

	Year 1	Year 2	Units	Average	Units	Source
NOx	187,811.00	147,089.00	lbs/year	458.77	lbs/day	RECLAIM Data
SOx	35,498.00	27,335.00	lbs/year	86.07	lbs/day	RECLAIM Data
CO	71,202.60	57,647.52	lbs/year	176.51	lbs/day	2012/2013 AER
PM	5,694.98	6,442.14	lbs/year	16.63	lbs/day	2011/2012 AER
VOC	4,662.08	3,774.54	lbs/year	11.56	lbs/day	2012/2013 AER
H2SO4	337.00	262.00	lbs/year	0.82	lbs/day	2012/2013 TRI

EF lbs/mmscf	EF lbs/mmbtu	Basis
133	0.100	ANs 254766, 131774, 131776 and 131775
34	0.026	ANs 254766, 131774, 131776 and 131775
4.1	0.003	ANs 254766, 131774, 131776 and 131775
21	0.016	ANs 254766, 131774, 131776 and 131775
7	0.005	ANs 254766, 131774, 131776 and 131775

Wilmington HCU Heaters H-300 and H-301 (Combined Emissions)

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	9,384.00	7,132.00	lbs/year	22.62	lbs/day	RECLAIM Data
SOx	871.77	871.77	lbs/year	2.39	lbs/day	2012/2013: PTE as "actuals" exceed PTE.
CO	2,194.65	2,194.65	lbs/year	6.01	lbs/day	2012/2013: PTE as "actuals" exceed PTE.
PM	1,387.07	1,725.38	lbs/year	4.26	lbs/day	2011/2012 AER
VOC	1,610.35	1,857.66	lbs/year	4.75	lbs/day	2012/2013 AER
H2SO4*	2.29E+01	3.20E+01	lbs/year	0.08	lbs/day	2012/2013 TRI

* Assumes a post mod H2SO4 EF of 0 lbs/mmbtu for Natural Gas Combustion.

Emission Factors

See Heater PTE calculations

Wilmington H-100 Heater (This is a Contemporaneous Project)

Historic Emissions

	Year 1	Year 2	Units	Average	Units	Source
NOx	59,873.00	90,088.00	lbs/year	205.43	lbs/day	RECLAIM Data
SOx	17,195.00	23,800.00	lbs/year	56.16	lbs/day	RECLAIM Data
CO	53,975.95	61,456.85	lbs/year	158.13	lbs/day	2012/2013 AER
PM	11,323.88	11,566.28	lbs/year	31.36	lbs/day	2011/2012 AER
VOC	10,795.19	12,291.37	lbs/year	31.63	lbs/day	2012/2013 AER
H2SO4*	3.53E+01	4.83E+01	lbs/year	0.11	lbs/day	2012/2013 TRI

* Assumes an H2SO4 EF of 0.0275 lbs/mmbscf.

Emission Factors

See Heater PTE calculations

ATTACHMENT D

SUMMARY OF EMISSIONS INCREASES – NEW, MODIFIED AND AFFECTED SOURCES

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Post-Project Potential Emissions for New and Modified Units
Facility: Carson and Wilmington

Constants

O2 Conc (Heaters)	3	percent (dry)
O2 Conc (Cogen)	15	percent (dry)
F-factor	8710	dscf/mmbtu (40 CFR 60 App A Meth. 19)
NOx Conc Conv Factor	1.19E-07	ppm to lbs/scf (40 CFR 60 App A Meth. 19)
Fuel HHV	1026	btu/scf (natural gas; 40 CFR 98 default)
Operating Hours	24	hrs/day
Operating Hours	365	days/year
Ideal Gas Constant	385.24	scf/lbmol @ 68 F

Emission Factors

SOx EF	0.6	lbs/mmscf (AER Default Factor)
CO EF	35	lbs/mmscf (AER Default Factor' ~0.033 lbs/mmbtu)
PM EF	7.5	lbs/mmscf (AER Default Factor)
VOC EF	7	lbs/mmscf (AER Default Factor)

Sulfuric Acid Plant Process Air Heater (LARW)

Max Firing Rate	20	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	3,042.48	
NOx (Routine)	6.99	2,552.88	12 ppmv NOx
SOx	0.28	102.46	AER default for NG.
CO	16.37	5,976.61	AER default for NG.
PM	3.51	1,280.70	AER default for NG.
VOC	3.27	1,195.32	AER default for NG.
H2SO4	0.01	3.98	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calculated)	0.048570853	lb/mmbtu
NOx SSC Emissions:	0.971417055	lbs/hr (max)

Sulfuric Acid Plant Decomposition Furnace (LARW)

Max Firing Rate	42	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	2,288.85	
NOx (Routine)	2.45	893.51	2 ppmv NOx
SOx	0.59	215.16	AER default for NG.
CO	34.39	12,550.88	AER default for NG.
PM	7.37	2,689.47	AER default for NG.
VOC	6.88	2,510.18	AER default for NG.
H2SO4	0.03	9.18	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calcu	0.048570853	lb/mmbtu
NOx SSC Emission	2.039975815	lbs/hr (max)

Sulfuric Acid Plant Converter Heater (LARW)

Max Firing Rate	5	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	760.62	
NOx (Routine)	1.75	638.22	12 ppmv NOx
SOx	0.07	25.61	AER default for NG.
CO	4.09	1,494.15	AER default for NG.
PM	0.88	320.18	AER default for NG.
VOC	0.82	298.83	AER default for NG.
H2SO4	0.00	1.00	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calc	0.048570853	lb/mmbtu
NOx SSC Emissio	0.242854264	lbs/hr (max)

Sulfuric Acid Plant Process Vent Emissions (LARW)

Max Firing Rate	NA	mmbtu/hr
HHV NG	NA	mmbtu/mmscf

Assumptions: Associated with Decomp Furnace Stack

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)			
NOx (Routine)			
SOx	31.12	11,356.99	see Attachment K
CO			
PM			
VOC			
H2SO4			see Attachment K

Sulfuric Acid Plant Total Emissions (LARW)

	Daily Controlled lbs/day	Annual lbs/yr	Annual tpy	
NOx (SSC)	--	6,091.95	3.05	
NOx (Routine)	11.19	4,084.61	2.04	
SOx	32.06	11,700.22	5.85	
CO	54.85	20,021.64	10.01	
PM	11.75	4,290.35	2.15	
VOC	10.97	4,004.33	2.00	
H2SO4	0.04	14.16	**0.01**	see Attachment K

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Post-Project Potential Emissions for New and Modified Units
Facility: Carson and Wilmington

NHDS Heater (D1433) Post-Mod PTE

Max Firing Rate	12.5	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/ULNB

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	1,901.55	
NOx (Routine)	4.37	1,595.55	ULNB (12 ppmv)
SOx	0.66	240.90	2002 Application
CO	10.23	3,735.38	AER default for NG.
PM	6.00	2,190.00	permit condition
VOC	1.92	700.80	permit condition
H2SO4	0.03	9.37	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calculated):	0.048570853	lb/mmbtu
NOx SSC Emissions:	0.607135659	lbs/hr (max)

HCU H-300 Post-Mod PTE

Max Firing Rate	65.1	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	5,454.39	
NOx (Routine)	9.49	3,462.35	5 ppmv NOx
SOx	0.91	333.49	AER default for NG.
CO	53.30	19,453.86	AER default for NG.
PM	11.42	4,168.68	AER default for NG.
VOC	10.66	3,890.77	AER default for NG.
H2SO4	0.04	14.23	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calcu	0.048570853	lb/mmbtu
NOx SSC Emission	3.161962513	lbs/hr (max)

HCU H-301 Post-Mod PTE

Max Firing Rate	31	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	2,597.33	
NOx (Routine)	4.52	1,648.74	5 ppmv NOx
SOx	0.44	158.81	AER default for NG.
CO	25.38	9,263.74	AER default for NG.
PM	5.44	1,985.09	AER default for NG.
VOC	5.08	1,852.75	AER default for NG.
H2SO4	0.02	6.77	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calc	0.048570853	lb/mmbtu
NOx SSC Emissio	1.505696435	lbs/hr (max)

51 Vac Heater (D63) Post-Mod PTE

Max Firing Rate	360	mmbtu/hr
HHV NG	1050	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	44,220.85	
NOx (Routine)	94.42	34,463.93	9 ppmv NOx
SOx	4.94	1,802.06	AER default for NG.
CO	247.00	90,155.00	Calc'd by AQMD
PM	53.00	19,345.00	Calc'd by AQMD
VOC	50.00	18,250.00	Calc'd by AQMD
H2SO4	0.21	76.71	see Attachment K

CO EF:	29.6	lbs/mmscf (applied by AQMD)
PM EF:	6.3	lbs/mmscf (applied by AQMD)
VOC EF:	5.9	lbs/mmscf (applied by AQMD)

- CO, PM and VOC emission factors provided by SCAQMD.
- CO, PM and VOC emissions rounded "up" to the nearest whole number.

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calculate	0.05	lb/mmbtu
NOx SSC Emissions:	17.49	lbs/hr (max)

DCU H-100 Post-Mod PTE

Max Firing Rate	302.4	mmbtu/hr
HHV NG	1230	mmbtu/mmscf

Assumptions: RFG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	87,220.49	
NOx (Routine)	181.44	66,225.60	
SOx	250.00	91,250.00	
CO	178.00	64,970.00	Calc'd by AQMD
PM	38.00	13,870.00	Calc'd by AQMD
VOC	36.00	13,140.00	Calc'd by AQMD
H2SO4	10.66	3,892.66	see Attachment K

CO EF:	29.6	lbs/mmscf (applied by AQMD)
PM EF:	6.3	lbs/mmscf (applied by AQMD)
VOC EF:	5.9	lbs/mmscf (applied by AQMD)

- CO, PM and VOC emission factors provided by SCAQMD.
- CO, PM and VOC emissions rounded "up" to the nearest whole number.

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	100	ppmv
NOx SSC EF (cal	0.12	lb/mmbtu
NOx SSC Emissic	36.72	lbs/hr (max)

NOx (Routine) (Daily): Emissions based on R1109 EF of 0.03 lb/mmbtu and 252 mmbtu/hr (previous described firing rate).
SOx (Daily): Max daily emissions assumed to be 250 lbs/day (based on historical operating data).
SOx (Hourly): Max hourly emissions assumed to be 22 lbs/hr (based on historical operating data).

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Modified Units
Facility: Carson and Wilmington

Carson 51 Vacuum Unit Heater (D63) - Duty Bump to 360 MMBtu/Hr

	Baseline Actual Emissions (Lbs/Day)	Post Mod Emissions (Lbs/Year)	Increase (TPY)	Pre-Mod Basis	Post-Mod Basis
NOx	22.32	44,220.85	18.04	RECLAIM Emissions (2012/2013)	2014 Permit Application
SOx	3.56	1,802.06	0.25	2012/2013 AER	2014 Permit Application
CO	12.75	90,155.00	42.75	2012/2013 AER	2014 Permit Application
PM	7.98	19,345.00	8.22	2011/2012 AER	2014 Permit Application
VOC	16.48	18,250.00	6.12	2012/2013 AER	2014 Permit Application
H2SO4*	0.15	76.71	0.01	2012/2103 TRI	See Attachment K calculations.

** NOx emissions include "routine" operations as well as maximum startup, shutdown and commssioning emissions.

Wilmington H-100 Heater - Duty Bump to 302.4 MMBtu/Hr

	Baseline Actual Emissions (Lbs/Day)	Post Mod Emissions (Lbs/Year)	Increase (TPY)	Pre-Mod Basis	Post-Mod Basis
NOx	205.43	87,220.49	6.12	2012: RECLAIM Data. 2013: PTE as "actuals" exceed PTE.	2014 Permit Application
SOx	56.16	91,250.00	35.38	2012/2013 AER	2014 Permit Application
CO	158.13	64,970.00	3.63	2012/2013 AER	2014 Permit Application
PM	31.36	13,870.00	1.21	2011/2012 AER	2014 Permit Application
VOC	31.63	13,140.00	0.80	2012/2013 AER	2014 Permit Application
H2SO4*	0.11	3,892.66	1.93	2012/2103 TRI	See Attachment K calculations.

** NOx emissions include "routine" operations as well as maximum startup, shutdown and commssioning emissions.

Carson NHDS Ultra-Low NOx Burner Installation (RW0053; D1433)

	Baseline Actual Emissions (Lbs/Day)	Post Mod Emissions (Lbs/Year)	Increase (TPY)	Pre-Mod Basis	Post-Mod Basis
NOx	4.24	1,901.55	0.18	2012/2013 RECLAIM Emissions	Vendor guarantee
SOx	0.06	240.90	0.11	2012/2013 AER	2002 permit application
CO	0.03	3,735.38	1.86	2012/2013 AER	AER Default for NG
PM	0.17	2,190.00	1.06	2011/2012 AER	Permit condition A63.19
VOC	0.17	700.80	0.32	2012/2013 AER	Permit condition A63.19
H2SO4*	0.00	9.37	0.00	2012/2103 TRI	See Attachment K calculations.

** NOx emissions include "routine" operations as well as maximum startup, shutdown and commssioning emissions.

Wilmington HCU Heaters H-300 and H-301 Duty Bump (Also install ULNB and SCR and Convert to NG)

	Baseline Actual Emissions (Lbs/Day)	Post Mod Emissions (Lbs/Year)	Increase (TPY)	Pre-Mod Basis	Post-Mod Basis
NOx	22.62	8,051.71	(0.10)	2012/2013 RECLAIM Emissions	5 ppmv Nox (calculated)
SOx	2.39	492.30	(0.19)	2012/2013 RECLAIM Emissions	AER Default for NG
CO	6.01	28,717.60	13.26	2012/2013 AER	AER Default for NG
PM	4.26	6,153.77	2.30	2011/2012 AER	AER Default for NG
VOC	4.75	5,743.52	2.00	2012/2013 AER	AER Default for NG
H2SO4*	0.08	21.00	(0.00)	2012/2103 TRI	See Attachment K calculations.

** NOx emissions include "routine" operations as well as maximum startup, shutdown and commssioning emissions.

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Affected Sources (Increased Utilization)
Facility: Wilmington

Wilmington H-101 Heater (D32)

Anticipated Incremental Increase in Firing Rate:	7	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	245.68	264.68	3.47	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	37.35	44.94	1.38	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	0.24	4.60	0.80	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	17.27	18.10	0.15	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	12.41	13.24	0.15	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.56	1.75	0.22	See Attachment K calculations.

Wilmington H-30 Heater (D157)

Anticipated Incremental Increase in Firing Rate:	4.1	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	41.48	49.35	1.44	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	5.09	7.62	0.46	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	14.54	14.92	0.07	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	2.92	4.89	0.36	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	2.91	4.50	0.29	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.00	0.30	0.05	See Attachment K calculations.

Wilmington H-21/H-22 Heater (D158)

Anticipated Incremental Increase in Firing Rate:	4.1	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	45.81	58.50	2.32	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	4.27	5.60	0.24	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	12.31	15.07	0.50	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	2.53	3.12	0.11	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	2.46	3.07	0.11	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.00	0.22	0.04	See Attachment K calculations.

Wilmington H-510 Heater (D218)

Anticipated Incremental Increase in Firing Rate:	0.4	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	34.58	35.06	0.09	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	10.37	10.61	0.04	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	29.44	30.04	0.11	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	5.98	6.13	0.03	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	5.89	5.94	0.01	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.00	0.41	0.07	See Attachment K calculations.

Wilmington H-501A, H-501B, H-502, H-503/504 Heater (D216, D217, D214 and D215)

Anticipated Incremental Increase in Firing Rate:	1.6	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	83.96	85.23860657	0.23	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	23.81	24.22	0.08	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	59.10	60.05	0.17	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	29.90	30.49	0.11	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	10.96	11.14	0.03	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.37	1.03	0.12	See Attachment K calculations.

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Affected Sources (Increased Utilization)
Facility: Wilmington

Wilmington SRP H-1601/H-1602 Boilers (D76 and D77)

Anticipated Incremental Increase in Firing Rate:	0.125	**mmbtu/hr**

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	147.87	147.98	0.02	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	10.86	10.90	0.01	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	180.81	180.82	0.00	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	18.26	18.32	0.01	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	11.84	11.86	0.00	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.11	0.42	0.06	See Attachment K calculations.

Wilmington SRP Incinerators F-704 (C56)

Estimated Incremental Increase in Sulfur Production:	3	Long Tons Per Day
Estimated % Increase in Sulfur Production:	1.4%	percent

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	16.81	17.05	0.04	See note below
SOx	19.67	32.33	2.31	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	3.81	3.86	0.01	See note below
PM	0.84	0.85	0.00	See note below
VOC	0.76	0.77	0.00	See note below
H2SO4	0.01	1.26	0.23	See Attachment K calculations.

* SOx emissions increases estimated based on SRP conversion efficiency. Other criteria pollutant emissions increases estimated based on historic emissions data multiplied by the estimated % sulfur loading increase.
** EF estimated based on an ultra conservative 99.9% conversion efficiency from sulfur compounds to elemental sulfur.

Wilmington SRP Incinerators F-754 (C54)

Anticipated Incremental Increase in Sulfur Production:	3	Long Tons Per Day
Estimated % Increase in Sulfur Production:	1.4%	percent

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	36.33	36.86	0.10	See note below
SOx	11.62	24.29	2.31	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	2.32	2.35	0.01	See note below
PM	0.93	0.95	0.00	See note below
VOC	0.77	0.78	0.00	See note below
H2SO4	0.01	0.94	0.17	See Attachment K calculations.

* SOx emissions increases estimated based on SRP conversion efficiency. Other criteria pollutant emissions increases estimated based on historic emissions data multiplied by the estimated % sulfur loading increase.
** EF estimated based on an ultra conservative 99.9% conversion efficiency from sulfur compounds to elemental sulfur.

Wilmington Boilers 7 and 8 (D722 and D723)

Anticipated Incremental Increase in Firing Rate:	5	**mmbtu/hr**

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	237.88	249.88	2.19	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	70.21	73.28	0.56	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	138.35	138.72	0.07	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	7.12	9.01	0.35	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	8.92	9.55	0.12	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	1.09	2.85	0.32	See Attachment K calculations.

Tesoro Los Angeles Refinery Integration and Compliance Project

Attachment D: Summary of Emissions Increases - Affected Sources (Increased Utilization)

Facility: Wilmington

Wilmington Boilers 9 and 10 (D724 and D725)

Anticipated Incremental Increase in Firing Rate:	5	**mmbtu/hr**

	Baseline Actual Emissions (Lbs/Day)	**Projected Emissions (Lbs/Day)**	**Increase (TPY)**	**Baseline + Incremental Basis**
NOx	458.77	470.77	2.19	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	86.07	89.14	0.56	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	176.51	176.88	0.07	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	16.63	18.52	0.35	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	11.56	12.19	0.12	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.82	3.47	0.48	See Attachment K calculations.

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Affected Sources (Increased Utilization)
Facility: Carson

Carson HC R-1 Heater (D625)

Anticipated Incremental Increase in Firing Rate:	15	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	29.25	47.25	3.29	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	8.10	12.61	0.82	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	0.13	1.17	0.19	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	2.55	7.94	0.98	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	1.60	3.37	0.32	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.32	0.49	0.03	See Attachment K calculations.

Carson HC R-2 Heater (D627)

Anticipated Incremental Increase in Firing Rate:	20	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	21.31	35.71	2.63	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	7.40	17.00	1.75	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	1.53	2.92	0.25	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	1.29	8.47	1.31	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	0.62	2.98	0.43	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.22	0.66	0.08	See Attachment K calculations.

Carson LHU Heater (D425)

Anticipated Incremental Increase in Firing Rate:	5	mmbtu/hr

	Baseline Actual Emissions (Lbs/Day)	Projected Emissions (Lbs/Day)	Increase (TPY)	Baseline + Incremental Basis
NOx	8.84	14.84	1.10	Baseline Emissions + Incremental Increase in Firing Rate * EF
SOx	1.60	3.10	0.27	Baseline Emissions + Incremental Increase in Firing Rate * EF
CO	1.08	1.44	0.07	Baseline Emissions + Incremental Increase in Firing Rate * EF
PM	0.61	2.48	0.34	Baseline Emissions + Incremental Increase in Firing Rate * EF
VOC	0.40	1.02	0.11	Baseline Emissions + Incremental Increase in Firing Rate * EF
H2SO4	0.04	0.12	0.01	See Attachment K calculations.

ATTACHMENT E

SUMMARY OF EMISSIONS INCREASES – CARSON FCCU REGENERATOR AND PRE-HEATER

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment E: FCCU Regenerator Capable of Accommodating Rates
Facility: Carson

Month	Year	MBbl/day	Month	Year	MBbl/day	Month	Year	MBbl/day
1	2011	86.5	1	2012	84.5	1	2013	95.0
2	2011	97.2	2	2012	71.1	2	2013	NA
3	2011	87.2	3	2012	72.3	3	2013	89.6
4	2011	85.2	4	2012	67.5	4	2013	100.6
5	2011	100.0	5	2012	97.3	5	2013	98.1
6	2011	94.1	6	2012	96.6	6	2013	96.1
7	2011	96.1	7	2012	90.5	7	2013	94.8
8	2011	90.7	8	2012	89.8	8	2013	91.1
9	2011	91.5	9	2012	93.1	9	2013	74.1
10	2011	92.3	10	2012	98.2	10	2013	75.0
11	2011	77.2	11	2012	98.1	11	2013	64.4
12	2011	88.7	12	2012	90.1	12	2013	73.2

COA Feedrate:	**99.96**	MBbl/day (2011-2012)
COA Feedrate:	**100.56**	MBbl/day (2012-2013)

Notes

PM baseline and COA feed rates based on the 2011-2012 baseline; all other pollutants based on the 2012-2013 baseline.

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment E: Summary of Emissions Increases - Carson FCCU Regenerator and Pre-Heater (Increased Utilization)
Facility: Carson

Carson FCCU Regenerator (Process 3, System 1)

Estimated NOx Emissions During Startup Events:	12,270.7	**lbs/month**
Estimated SOx Emissions During Startup Events:	27,020.1	**lbs/month**

Emissions Increase Calculation (Excluding COA)		**NOx**	**SOx**	**CO**	**PM**	**VOC**	**H2SO4**
Baseline Emissions (lbs/day)*	A	59.91	724.63	533.71	163.91	17.99	13.56
Capable of Accomodating Emissions (lbs/day)**	B	-	-	-	-	-	-
Projected Emissions (lbs/day)***	C	102.29	909.79	656.12	256.25	20.02	16.71
Demand Growth Emissions (lbs/day)	Not Applicable	-	-	-	-	-	-
Emissions Increase (tpy)	E = C - A	7.73	33.79	22.34	16.85	0.37	0.57

Emissions Increase Calculation (Utilizing COA)		**NOx**	**SOx**	**CO**	**PM**	**VOC**	**H2SO4**
Baseline Emissions (lbs/day)*	A	59.91	724.63	533.71	163.91	17.99	13.56
Capable of Accommodating Emissions (lbs/day)**	B	73.50	894.52	643.72	249.90	19.65	16.39
Projected Emissions (lbs/day)***	C	102.29	909.79	656.12	256.25	20.02	16.71
Demand Growth Emissions (lbs/day)	D = B - A	13.59	169.88	110.02	85.99	1.65	2.83
Emissions Increase (tpy)	E = C - A - D	5.25	2.79	2.26	1.16	0.07	0.06

Calculation Basis

Capable of Accommodating Feed Rate (mbbls/day)**	B	**100.56**	**100.56**	**100.56**	**99.96**	**100.56**	**100.56**
Capable of Accommodating Emission Factor (lbs/mbbl)**		0.73	8.89	6.40	2.50	0.20	0.16
Projected Feed Rate (mbbl/day)***	C	**102.5**	**102.5**	**102.5**	**102.5**	**102.5**	**102.5**
Projected Emission Factor (lbs/mbbl)***		0.73	8.89	6.40	2.50	0.20	0.16

Notes

* Baseline Emissions: 2012/2013 reported data for all pollutants except PM which is based on 2011/2012 reported data.

** Capable of Accomodating Emissions: Calculated as monthly average feed rate achieved during the baseline period x EF.

*** Projected Emissions: Calculated as Projected Feed Rate (mbbl/day) x EF. NOx/SOx projected emissions includes 1 month of startup emissions. Calculated as [(Projected Feed Rate (MBbl/Day) x EF x 365 / 12 x 11) + Estimated Startup Emissions] / 365. EFs based on continuous emissions monitoring, source test data, or other reliable engineering estimates (e.g., rule based factors).

Carson FCCU Pre-Heater (D250)

Estimated SOx Emissions During Startup Events:	1,108	**lbs/month**

Emissions Increase Calculation (Excluding COA)		**NOx**	**SOx**	**CO**	**PM**	**VOC**	**H2SO4**
Baseline Emissions (lbs/day)*	A	39.00	9.21	-	7.06	2.55	0.46
Capable of Accommodating Emissions (lbs/day)**	B	-	-	-	-	-	-
Projected Emissions (lbs/day)***	C	70.61	20.30	6.15	15.51	4.15	1.11
Demand Growth Emissions (lbs/day)	Not Applicable	-	-	-	-	-	-
Emissions Increase (tpy)	E = C - A	5.77	2.02	1.12	1.54	0.29	0.12

Emissions Increase Calculation (Utilizing COA)		**NOx**	**SOx**	**CO**	**PM**	**VOC**	**H2SO4**
Baseline Emissions (lbs/day)*	A	39.00	9.21	-	7.06	2.55	0.46
Capable of Accommodating Emissions (lbs/day)**	B	52.13	13.90	4.54	11.45	3.06	0.82
Projected Emissions (lbs/day)***	C	70.61	20.30	6.15	15.51	4.15	1.11
Demand Growth Emissions (lbs/day)	D = B - A	13.13	4.70	4.54	4.39	0.51	0.36
Emissions Increase (tpy)	E = C - A - D	3.37	1.17	0.29	0.74	0.20	0.05

Calculation Basis

Capable of Accommodating Firing Rate (mmscf/mo)**	B	**35.53**	**35.53**	**35.53**	**35.53**	**35.53**	**35.53**
Capable of Accommodating Firing Rate (mmbtuf/hr)**		**65.71**	**65.71**	**65.71**	**65.71**	**65.71**	**65.71**
Capable of Accommodating Emission Factor (lbs/mmscf)**		44.62	11.90	3.89	9.80	2.62	0.70
Projected Firing Rate (mmbtu/hr)***	C	**89.0**	**89.0**	**89.0**	**89.0**	**89.0**	**89.0**
Assumed Higher Heating Value (mmbtu/mmscf)		1,350	1,350	1,350	1,350	1,350	1,350
Projected Emission Factor (lbs/mmscf)***		44.62	11.90	3.89	9.80	2.62	0.70

Notes

* Baseline Emissions: 2012/2013 reported data for all pollutants except PM which is based on 2011/2012 reported data.

** Capable of Accomodating Emissions: Calculated as monthly average firing rate achieved during the baseline period x EF.

*** Projected Emissions: Calculated as Projected Firing Rate (mmbtu/hr) x EF. SOx projected emissions includes 1 month of startup emissions. Calculated as [(Projected Firing Rate (mmbtur/hr) x EF x 8760 / 12 x 11) + Estimated Startup Emissions] / 365. EFs based on continuous emissions monitoring, source test data, or other reliable engineering estimates (e.g., rule based factors).

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment E: FCCU Pre-Heater Capable of Accommodating Rates
Facility: Carson

Month	Year	mmscf/mo	Month	Year	mmscf/mo	Month	Year	mmscf/mo
1	2011	29.9	1	2012	32.5	1	2013	10.5
2	2011	30.7	2	2012	30.2	2	2013	-
3	2011	26.0	3	2012	35.5	3	2013	17.9
4	2011	27.2	4	2012	34.8	4	2013	26.8
5	2011	33.9	5	2012	32.4	5	2013	30.0
6	2011	33.5	6	2012	31.6	6	2013	30.5
7	2011	34.2	7	2012	30.5	7	2013	29.6
8	2011	33.6	8	2012	29.3	8	2013	27.9
9	2011	26.7	9	2012	30.2	9	2013	22.0
10	2011	33.7	10	2012	32.4	10	2013	19.6
11	2011	29.0	11	2012	32.9	11	2013	20.5
12	2011	32.5	12	2012	33.8	12	2013	26.5

COA Firing Rate:	**35.5**	mmscf/month (2011-2012)
COA Firing Rate:	**35.5**	mmscf/month (2012-2013)

Notes

PM baseline and COA duty rates based on the 2011-2012 baseline; all other pollutants based on the 2012-2013 baseline.

TESORO

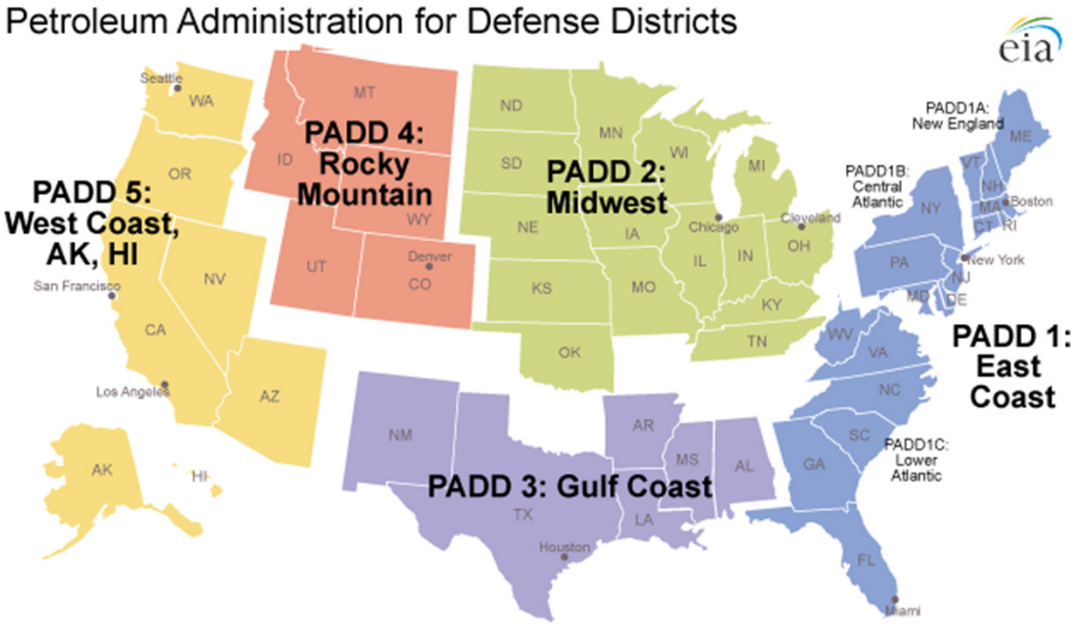
Strategy and Business Development

LAR Carson Operations FCCU Utilization

DATE: June 1, 2016
TO: June Christman
FROM: Douglas E. Miller
Vice President, California Value Chain Strategy
RE: FCCU Utilization Overview

The United States Energy Information Agency (EIA) provides petroleum data by geographic regions called Petroleum Administration of Defense Districts (PADD) (see Figure 1). The West Coast region is commonly referred to as PADD 5 and includes Tesoro's Los Angeles Refinery (LAR).

(Figure 1)

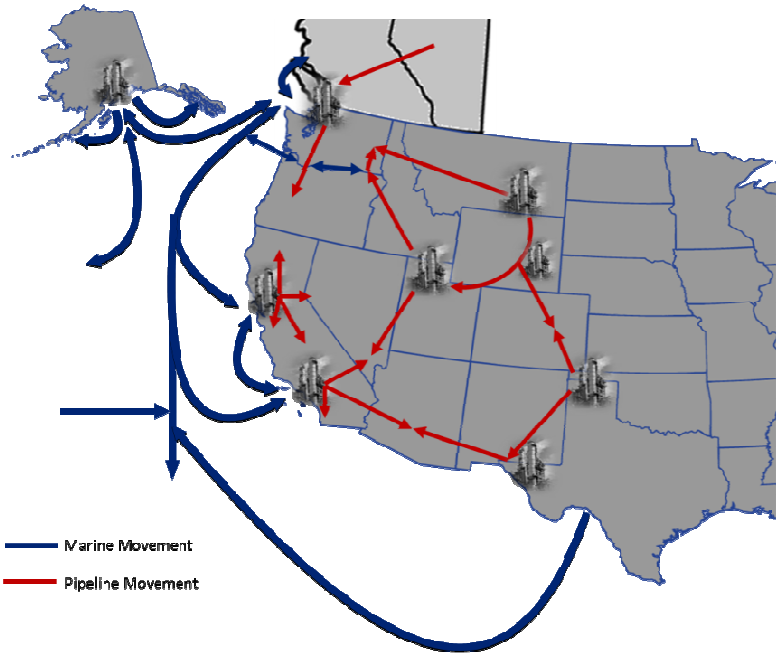


West Coast product supply is integrated with foreign supply and West Coast refining centers by marine movements and is integrated by pipeline movements from PADD 3 and PADD 4 as illustrated in Figure 2. The Southern California refining center, which includes Tesoro's LAR, is also integrated by West Coast marine movements as well as pipeline movements to Las Vegas, Nevada and Phoenix, Arizona within the Southern California region of PADD 5.

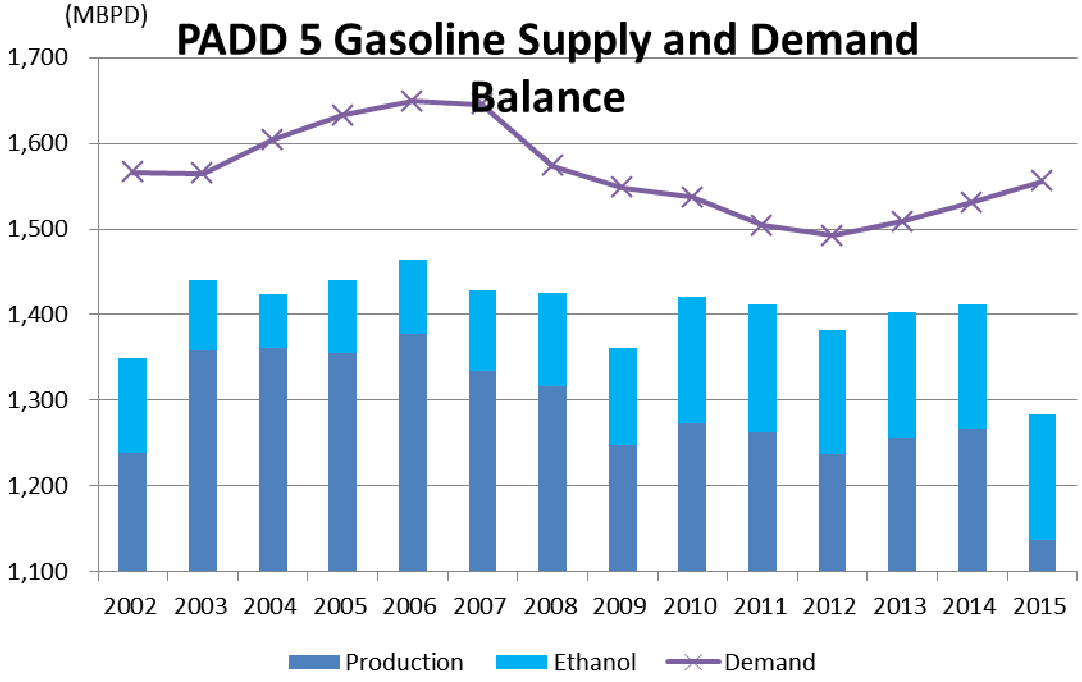
LAR Carson Operations FCCU Utilization

(Figure 2)

- West Coast product supply is integrated with all West Coast refining centers and foreign locations by marine movements
- West Coast is integrated to PADD III and PADD IV by pipeline
- Edmonton, Alberta products are transported to Vancouver, British Columbia by pipeline



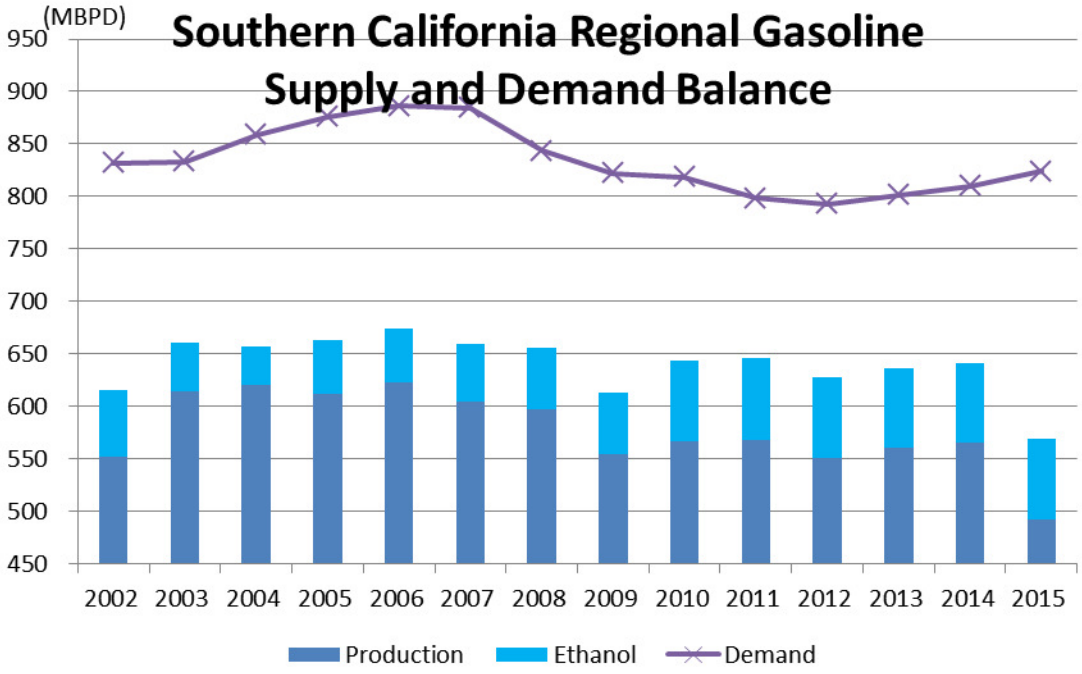
As indicated in Figure 3, the PADD 5 refinery production of gasoline plus ethanol blend stock falls below the PADD 5 demand. This supply shortage, represented as the difference between PADD 5 gasoline supply and demand, is met by pipeline transfers from PADD 3 and PADD 4 refineries and marine imports.
(Figure 3)



LAR Carson Operations FCCU Utilization

Similarly, as indicated in Figure 4, the Southern California refinery production of gasoline plus ethanol blend stock falls below the regional demand. This supply shortage, represented as the difference between Southern California regional gasoline supply and demand, is met by pipeline transfers from PADD 3 and PADD 4 refineries, marine movements, and imports.

(Figure 4)



As illustrated in Figures 3 and 4, PADD 5 and Southern California regional gasoline demand has grown at an annual rate of 1 to 1.7% since 2012. Continued economic recovery along with declining unemployment and increased vehicle miles traveled is expected to sustain PADD 5 and Southern California regional demand growth as current demand remains approximately 7% below 2006 and 2007 demand levels. Gasoline demand growth will be supplied most optimally by increased utilization of existing PADD 5 refinery capacity, supplemented with increased transfers from PADD 3 and PADD 4 refineries, and/or increased marine deliveries and imports.

Many economic factors contribute to determining the economic utilization of a refinery. Primary considerations in determining economic utilization include the refinery process capabilities, refinery variable cost, market cost of crude grades and feedstocks, and the value of refined products and byproducts. In general, refineries process a variety of crude oils and intermediate feedstocks that have costs that correlate to their feedstock qualities and the value of the product slate to which they produce. Linear program models are utilized to calculate the economic optimum crude slate and intermediate feedstocks utilization for the given market demand and value of products. Refineries often utilize intermediate feedstock purchases, such as naphtha's, distillates, gas oils, or residuals, to enable utilization of open capacity of refinery process units that would not otherwise be utilized by the optimum crude slate and crude rate determined by the linear program model.

LAR Carson Operations FCCU Utilization

The Fluid Catalytic Cracking Unit (FCCU) is a primary refinery gasoline production process unit at any refinery. The FCCU directly converts heavy gas oil feedstocks with boiling point range of approximately 600 ^{o}F to 1100 ^{o}F to gasoline boiling range products while also producing feedstocks for the alkylation unit and hydrocracker unit. Gas oil feedstocks are produced internally by refinery crude, vacuum, and coker units, and they are also purchased and sold between refineries to balance gas oil production with FCCU unit capacity. Depending on the relative demand and value of gasoline to diesel, approximately 75% to 90% of FCCU unit feedstock is converted to gasoline within the refinery FCCU and downstream process units.

The Carson Operations FCCU typically supplements unit feed with purchased gas oil in order to consistently achieve and maintain high operating rates. This has been a common practice at Carson Operations and, absent implementation of the Los Angeles Refinery Integration and Compliance (LARIC) project, this practice will continue. Tesoro's business plan is to implement the LARIC project; therefore its business projections include implementation of LARIC. Generally, the LARIC project will enable the Carson Operations FCCU to operate more consistently at full rates feeding gas oil internally produced by the Los Angeles Refinery without the need to purchase additional gas oil feedstock as has customarily been done. If, for some reason the LARIC project is not implemented, gas oil feedstock purchases will continue in order to maintain high unit operating rates.

In summary, PADD 5 gasoline supply is integrated with production from the PADD 5 refining centers, transfers from PADD 3 and PADD 4, and imports. Within the Southern California region, which includes pipeline supply to Las Vegas, Nevada and Phoenix, Arizona, gasoline production from Southern California refineries and ethanol blended to gasoline meets approximately 80% of the regional gasoline demand. Southern California gasoline production is transportation cost advantaged relative to other supply from PADD 3, PADD 4, marine movements within PADD 5, and imports, and thus provides the lowest cost, most efficient gasoline supply to the region. The LAR Carson Operations FCCU unit is a primary gasoline production unit that has historically operated at its stream day capacity to supply gasoline to the Southern California region. Similarly in the future, demand from the FCCU will dictate that it operate at its stream day capacity to produce gasoline and enable Tesoro's Los Angeles Refinery to continue to supply approximately 25% of the Southern California regional gasoline demand. This will occur regardless of whether Tesoro's LARIC project is implemented.

ATTACHMENT F

SUMMARY OF EMISSIONS INCREASES – CARSON COGENERATION PLANT

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment F: Carson Cogeneration Plant Capable of Accomodating Rates
Facility: Carson

Month	Year	mmbtu/hr	Month	Year	mmbtu/hr	Month	Year	mmbtu/hr
1	2012	3,791	1	2013	3,823	1	2014	3,823
2	2012	3,941	2	2013	4,134	2	2014	4,134
3	2012	3,778	3	2013	3,836	3	2014	3,836
4	2012	3,792	4	2013	4,029	4	2014	4,029
5	2012	4,096	5	2013	3,698	5	2014	3,698
6	2012	4,290	6	2013	3,854	6	2014	3,854
7	2012	4,186	7	2013	3,990	7	2014	3,990
8	2012	4,064	8	2013	3,973	8	2014	3,973
9	2012	4,060	9	2013	3,884	9	2014	3,884
10	2012	3,582	10	2013	3,909	10	2014	3,909
11	2012	4,105	11	2013	3,969	11	2014	3,969
12	2012	4,147	12	2013	3,934	12	2014	3,934

COA Firing Rate:	**4,290**	mmbtu/hour (June 2012-May 2014)
Baseline Firing Rate:	**3,958**	mmbtu/hour (June 2012-May 2014)

* Firing rates at the Cogeneration Unit are maintained at a relatively steady state of operation during the baseline period.

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment F: Summary of Emissions Increases - Carson Cogeneration Plant (Increased Utilization)
Facility: Carson

Carson Cogeneration Plant

Emissions Increase Calculation		**NOx**	**SOx**	**CO**	**PM**	**VOC**	**H2SO4**
Baseline Emissions (lbs/day)[1]	A	1,138.45	173.11	131.58	481.10	378.80	6.74
Excludable Capable of Accommodating Emissions (lbs/day)[2]	B	1,222.32	185.14	141.19	1,001.82	406.58	7.21
Projected Emissions (lbs/day)[3]	C	1,265.32	191.65	146.16	1,037.06	420.88	7.46
Demand Growth Emissions (lbs/day)	D = B - A	83.87	12.03	9.62	520.72	27.78	0.47
Emissions Increase (tpy)	E = C - A - D	7.85	1.19	0.91	6.43	2.61	0.05

Calculation Basis

Baseline Firing Rate (mmbtu/hr)[4]	--	**3,958**	**3,958**	**3,958**	**3,958**	**3,958**	**3,958**
Project Related Firing Rate (mmbtu/hr)[5]	--	**20**	**20**	**20**	**20**	**20**	**20**
Capable of Accommodating Firing Rate (mmbtu/hr)[6]	--	**4,290**	**4,290**	**4,290**	**4,290**	**4,290**	**4,290**
Excludable Capable of Accommodating Firing Rate (mmbtu/hr)[7]	B	**4,270**	**4,270**	**4,270**	**4,270**	**4,270**	**4,270**
Emission Factor (lbs/mmbtu)[8]	--	0.0119	0.0018	0.0014	0.0098	0.0040	0.0001
Projected Firing Rate (mmbtu/hr)[9]	C	**4,420**	**4,420**	**4,420**	**4,420**	**4,420**	**4,420**

Notes

1) Baseline Emissions: Based on June 2012 to May 2014 reported data.
2) Excludable Capable of Accomodating Emissions: Calculated as Excludable Capable of Accomodating Firting Rate x EF.
3) Projected Emissions: Calculated as Projected Firing Rate (MMBTU/Hr) x EF.
4) Baseline Firing Rate: Based on June 2012 to May 2014 data. Firing rates at the Cogeneration Unit are maintained at a relatively steady state of operation during the baseline period.
5) Project Related Firing Rate: Conservative estimate based on Tesoro/Fluor engineering evaluation of projected related increases in steam demand associated with the project. Tesoro is supporting the Demand Growth firing rate "unrelatedness" determination by identifying and including the portion of the firing rate which is "related" to the project and therefore not excludable.
6) Capable of Accommodating Firing Rate: Based on max monthly average of June 2012 to May 2014 firing rate data.
7) Excludable Capable of Accomodating Firing Rate: Calculated as the Capable of Accomodating Firing Rate minus the Project Related Firing Rate.
8) Emission Factors: NOx/SOx estimated based on CEMS data and average firing rate. CO/VOC estimated base on source test data and average firing rate. PM estimated based on factors used in SCAQMD permit applicaiton number 287882. H2SO4 estimated based on engineering estimate (Crane, Springer, Siegell, “New Method Estimates Sulfuric Acid Emissions from Fired Heaters,” Oil and Gas Journal, September 30, 2002).
9) Projected Firing Rate: As shown above, the project related firing rate increase is ~20 mmbtu/hr. The total Projected Firing Rate is estimated much higher than the project related increase to conservatively include increases that potentially may occur based on future increased electricity and steam demand which are unrelated to the project. Even at this conservatively high projected firing rate assumption, emissions increases resulting from this project will remain below PSD applicability thresholds.

Mike Waller

From: Stan.Lum@Fluor.com
Sent: Thursday, May 26, 2016 3:42 PM
To: Roudebush, Stephen H
Cc: Christman, June M.; Yaslik, Alan D; Jeff.Scherffius@Fluor.com; Bill.Parente@fluor.com; Ma.Katrina.Sanaie@fluor.com; Stan.Lum@Fluor.com
Subject: LARIC GENL - Process - Simplified Steam Demand Summary for the LARIC Project

Steve,

As requested, attached is a simplified Steam Demand Summary for the LARIC Project, Carson Operations. This summary tallies steam demand increases and decreases that will result from the implementation of the LARIC Project. This analysis concludes that the post-LARIC incremental steam demand at Carson Operations is about 6,200 pounds of increased demand on the 600 psig COGEN steam generation.

The steam demand summary focuses on the high pressure, 600 psig system and also accounts for incremental use of lower pressure systems. That is, if lower pressure steam users take steam letdown from high pressure steam users, that steam make is already accounted for in the overall steam balance for Carson Operations. It is not an incremental demand on the 600 psig system. If additional direct letdown of higher pressure steam to a lower pressure system is required for LARIC Project use, it is included in this simplified analysis as 600 psig system demand.

The overall steam demand at Wilmington Operations decreases with the retirement of FCCU. There is no interconnection of steam systems between the Wilmington and Carson Operations, so steam savings at Wilmington cannot be used by Carson Operations.

Please let me know if you have any questions.

Regards,

Stan

| Stan Lum | Director, Process Engineering | ***FLUOR***- Southern California | O +949.349.6771 | IODC 10.6771 | www.fluor.com |

sender and may not necessarily reflect the views of the company.

Overall Carson Steam, RevA, 26-May-2016, stl

CARSON REFINERY OVERALL STEAM CHANGES, SUMMARY LEVEL

Location	***Baseline*** *(1000 lb/hr)*	***Post-LARIC*** *(1000 lb/hr)*	***Delta*** *(1000 lb/hr)*
FCC Gas Plant (Tier 3)	69.0	79.5	+ 10.5
Light Hydro Unit (Tier 3)	10.8	16.2	+ 5.4
Hydrocracker (steam generator)	35.4	29.0	(6.4)
Replace 3 Steam Turbines with Motor Drivers	27.3	0.0	(27.3)
Propylene Railcar Unloading (New)	0.0	1.4	+ 1.4
Alkylation	162.4	204.9	+ 42.5
Alky SRN Depentanizer (New)	0.0	6.0	+ 6.0
#51 Vacuum Unit (and Units Heat Integration)	108.2	82.4	(25.9)
		TOTAL	+ 6.2

ATTACHMENT G

WILMINGTON FCCU SHUTDOWN – HISTORICAL EMISSIONS

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment G: FCCU Shutdown - Historical Emissions
Facility: Wilmington

FCCU Regenerator*

	Year 1	Year 2	Units	Average	Units	Source
NOx	74,051.82	83,289.19	lbs/year	215.54	lbs/day	
SOx	140,067.83	117,729.66	lbs/year	353.15	lbs/day	RECLAIM Data (2012/2013). Also includes bypass stack emissions.
CO	128,887.33	54,676.94	lbs/year	251.46	lbs/day	2012/2013 AER
PM	42,310.80	41,889.68	lbs/year	115.34	lbs/day	2011/2012 AER
VOC	83,623.68	116,420.40	lbs/year	274.03	lbs/day	2012/2013 AER
H2SO4	0.00E+00	0.00E+00	lbs/year	0.00E+00	lbs/day	2012/2013 TRI

CO Boiler (BO-1)*

	Year 1	Year 2	Units	Average	Units	Source
NOx	37,096.02	56,176.39	lbs/year	127.77	lbs/day	
SOx	12,279.90	12,797.80	lbs/year	34.35	lbs/day	RECLAIM Data (2012/2013). Also includes bypass stack emissions.
CO	213,647.53	266,811.62	lbs/year	658.16	lbs/day	2012/2013 AER
PM	8,720.77	8,705.12	lbs/year	23.87	lbs/day	2011/2012 AER
PM (SCAQMD ERC)	8,705.12	7,870.48	lbs/year	22.71	lbs/day	ERC Application
VOC (SCAQMD ERC)	6,299.76	5,695.75	lbs/year	16.43	lbs/day	ERC Application
H2SO4	2.64E+03	2.26E+03	lbs/year	6.71E+00	lbs/day	2012/2013 TRI

H2 Heater

	Year 1	Year 2	Units	Average	Units	Source
NOx	5,639.00	6,428.00	lbs/year	16.53	lbs/day	RECLAIM Data (2012/2013)
SOx	438.00	494.00	lbs/year	1.28	lbs/day	RECLAIM Data (2012/2013)
CO	1,422.40	1,538.85	lbs/year	4.06	lbs/day	2012/2013 AER
PM	645.90	304.80	lbs/year	1.30	lbs/day	2011/2012 AER
VOC	284.48	307.77	lbs/year	0.81	lbs/day	2012/2013 AER
H2SO4	5.47E+00	6.18E+00	lbs/year	1.59E-02	lbs/day	2012/2013 TRI

H3/4 Heater

	Year 1	Year 2	Units	Average	Units	Source
NOx	70,910.00	82,211.00	lbs/year	209.75	lbs/day	RECLAIM Data (2012/2013)
SOx	9,989.00	10,150.00	lbs/year	27.59	lbs/day	RECLAIM Data (2012/2013)
CO	10,567.23	22,499.00	lbs/year	45.30	lbs/day	2012/2013 AER
PM	17,714.85	17,857.51	lbs/year	48.73	lbs/day	2011/2012 AER
VOC	3,617.53	3,629.73	lbs/year	9.93	lbs/day	2012/2013 AER
H2SO4	2.30E+01	2.35E+01	lbs/year	6.37E-02	lbs/day	2012/2013 TRI

H5 Heater

	Year 1	Year 2	Units	Average	Units	Source
NOx	-	-	lbs/year	-	lbs/day	RECLAIM Data (2012/2013)
SOx	-	-	lbs/year	-	lbs/day	RECLAIM Data (2012/2013)
CO	-	-	lbs/year	-	lbs/day	2012/2013 AER
PM	-	-	lbs/year	-	lbs/day	2011/2012 AER
VOC	-	-	lbs/year	-	lbs/day	2012/2013 AER
H2SO4	0.00E+00	-	lbs/year	0.00E+00	lbs/day	2012/2013 TRI

Startup Heater (B-1)

	Year 1	Year 2	Units	Average	Units	Source
NOx	988.00	1,202.50	lbs/year	3.00	lbs/day	2012/2013 AER
SOx	4.56	5.55	lbs/year	0.01	lbs/day	2012/2013 AER
CO	266.00	323.75	lbs/year	0.81	lbs/day	2012/2013 AER
PM	-	57.00	lbs/year	0.08	lbs/day	2011/2012 AER
VOC	53.20	64.75	lbs/year	0.16	lbs/day	2012/2013 AER
H2SO4	0.00E+00	-	lbs/year	0.00E+00	lbs/day	2012/2013 TRI

Fugitive VOC Emissions (Fugitive Components at the FCCU)

	Year 1	Year 2	Units	Average	Units	Source
FCCU Recovery	3,392.59	4,633.06	lbs/year	10.99	lbs/day	Guideware database
FCCU Cracking	2,163.26	2,657.65	lbs/year	6.60	lbs/day	Guideware database
Total:	5,555.85	7,290.71	lbs/year	17.60	lbs/day	

VOC fugitive component emissions from the FCCU Regenerator, CO Boiler, H-2, H-3, H-4, H-5 and Startup Heaters are included as part of the Recovery and Cracking Systems (P3, S1 and S2)

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment G: FCCU Shutdown - Historical Emissions
Facility: Wilmington

Total Emissions (Reductions)

	Year 1	Year 2	Units	Average	Units	Average	Units
NOx	188,684.84	229,307.08	lbs/year	572.59	lbs/day	104.50	tons/year
SOx	162,779.29	141,177.01	lbs/year	416.38	lbs/day	75.99	tons/year
CO	354,790.49	345,850.16	lbs/year	959.78	lbs/day	175.16	tons/year
PM	69,392.32	68,814.11	lbs/year	189.32	lbs/day	34.55	tons/year
PM (Less SCAQMD ERC)**	--	--	--	--	--	30.41	tons/year
VOC	99,434.50	133,409.11	lbs/year	318.96	lbs/day	58.21	tons/year
VOC (Less SCAQMD ERC)**	--	--	--	--	--	55.21	
H2SO4	2,668.86	2,290.14	lbs/year	6.79E+00	lbs/day	1.24	tons/year

* NOx and SOx emissions from the Wilmington FCCU Regenerator and CO boiler are monitored using a common stack equipped with a NOx and SOx CEMS. To calculate NOx and SOx emissions from the FCCU Regenerator and CO boiler separately, the following methods were employed:
- CO Boiler NOx: Estimated using combined stack NOx concentration, fuel gas usage at the CO Boiler, combustion F-Factor and the HHV from the fuel gas chromatograph.
- CO Boiler SOx: Estimated using the calculated total sulfur in the fuel gas and fuel gas usage at the CO Boiler.
- CO Boiler CO: Estimated using combined stack CO concentration, fuel gas usage at the CO Boiler, combustion F-Factor and the HHV from the fuel gas chromatograph.
- FCCU Regenerator NOx: Estimated using the CEMS monitored NOx emissions less the estimated NOx emissions from the CO Boiler.
- FCCU Regenerator SOx: Estimated using the CEMS monitored SOx emissions less the estimated SOx emissions from the CO Boiler.
- FCCU Regenerator CO: Estimated using the calculated/reported CO emissions less the estimated CO emissions from the CO Boiler.
** For PSD applicability analysis ERCs issued to the facility are not included as a creditable emissions reduction.

ATTACHMENT H

PSD SIGNIFICANT EMISSIONS INCREASE CALCULATIONS – CONSOLIDATED SUMMARY OF STEPS 1 AND 2

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment H: PSD Significant Emissions Increase Calculations - Consolided Summary of Steps 1 and 2

			Emissions Change (Tons Per Year)					
			NOx	SOx	CO	PM-10	TSP	H_2SO4
	Significant Emissions Increase Analysis (Step 1)	**Calculation Methodology**						
1	New Units - Wilmington	A- Step 1 - PSD Sig Em Increase SUM(8:11)	3.05	5.85	10.01	3.24	3.24	1.10
2	New Units - Carson[1]	A- Step 1 - PSD Sig Em Increase SUM(13:14)	-	-	-	-	-	-
3	***Total New Units***		***3.05***	***5.85***	***10.01***	***3.24***	***3.24***	***1.10***
4								
5	Modified Units - Wilmington	A- Step 1 - PSD Sig Em Increase Sum(21:25, 43:44)	-	-	13.26	2.30	2.30	-
6	Modified Units - Carson	A- Step 1 - PSD Sig Em Increase Sum(27:39, 41:42)	18.21	0.36	44.61	9.28	9.28	0.01
7	***Total Modified Units***		***18.21***	***0.36***	***57.88***	***11.58***	***11.58***	***0.01***
8								
9	Affected Sources - Wilmington	A- Step 1 - PSD Sig Em Increase SUM(51:61)	12.08	7.96	1.81	1.53	1.53	1.77
10	Affected Sources - Carson	A- Step 1 - PSD Sig Em Increase SUM(64:71) - SUM(64-66)	7.01	2.85	0.51	2.63	2.63	0.13
11	Affected Sources - Carson Cogen (Projected Emissions)	F- Cogen Ems (C10:H10)	230.92	34.98	26.67	189.26	189.26	1.36
12	Affected Sources - Carson FCCU (Projected Emissions)	E- Cars FCCU (Incr Util) (C13:H13)	18.67	166.04	119.74	46.77	46.77	3.05
13	Affected Sources - Carson FCCU Pre-Heater (Projected Emissions)	E- Cars FCCU (Incr Util) (C44:H44)	12.89	3.70	1.12	2.83	2.83	0.20
14	Affected Sources - Carson Cogen (Baseline Emissions)	F- Cogen Ems (C8:H8)	207.77	31.59	24.01	87.80	87.80	1.23
15	Affected Sources - Carson FCCU (Baseline Emissions)	E- Cars FCCU (Incr Util) (C11:H11)	10.93	132.25	97.40	29.91	29.91	2.47
16	Affected Sources - Carson FCCU Pre-Heater (Baseline Emissions)	E- Cars FCCU (Incr Util) (C42:H42)	7.12	1.68	-	1.29	1.29	0.08
17	Affected Sources - Carson Cogen (Demand Growth Emissions)	F- Cogen Ems (C11:H11)	15.31	2.19	1.76	95.03	95.03	0.09
18	Affected Sources - Carson FCCU (Demand Growth Emissions)	E- Cars FCCU (Incr Util) (C14:H14)	-	-	-	-	-	-
19	Affected Sources - Carson FCCU Pre-Heater (Demand Growth Emissions)	E- Cars FCCU (Incr Util) (C45:H45)	-	-	-	-	-	-
20	***Total Affected Sources***	Sum Rows 9:10 + Sum Rows 11:13 - Sum Rows 14:16 - Sum Rows 17:19	***40.44***	***47.81***	***26.68***	***28.99***	***28.99***	***2.63***
21								
22	***Total (Net Emissions Change)***	Row 3 + Row 7 + Row 17	61.70	54.02	94.57	43.81	43.81	3.75
23	**PSD Significance Threshold (tpy)**		40.0	40.0	100.0	15.0	25.0	7.0
24	***Exceeds Threshold***		**Yes**	**Yes**	No	**Yes**	**Yes**	No
25								
26								
27	**Significant Net Emissions Increase Analysis (Step 2)**							
28	Project Emissions Increase (Step 1)	Row 19	61.70	54.02	94.57	43.81	43.81	3.75
29	Project Emissions Reductions	B - Step 2 - PSD Net Eval Row 13	(104.60)	(76.18)	(175.16)	(30.41)	(30.41)	(1.24)
30	Contemporaneous Project Emissions	B - Step 2 - PSD Net Eval Rows 32, 96, 111, 157	8.46	36.31	4.45	1.35	1.35	1.93
31	***Net Emissions Change***	Row 25 + Row 26 + Row 27	**(34.4)**	**14.2**	**(76.1)**	**14.7**	**14.7**	**4.4**
32	**PSD Significance Threshold (tpy)**		40.0	40.0	100.0	15.0	25.0	7.0
33	***Exceeds Threshold***		No	No	No	No	No	No

ATTACHMENT I

SUMMARY OF EMISSIONS INCREASES – MONTHLY BY MONTH EVALUATION

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment I: Summary of Emissions Increases - Month by Month Evaluation
Facility: Carson and Wilmington

Emissions *Change* by Month

Pollutant	Contemporaneous Project	Aug 2016	Sep 2016	Oct 2016	Nov 2016	Dec 2016	Jan 2017	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017
NOx	(14.86)	-	12.08	-	-	-	-	-	-	-	-	1.10	(67.60)	-	-	-	7.85	-
SOx	30.05	-	7.96	-	-	-	-	-	-	-	-	0.27	(33.99)	-	-	-	1.19	-
CO	(115.66)	-	1.81	-	-	-	-	-	-	-	-	0.07	(16.46)	-	-	-	0.91	-
PM-10	1.13	-	1.53	-	-	-	-	-	-	-	-	0.34	(8.44)	-	-	-	6.43	-
TSP	1.13	-	1.53	-	-	-	-	-	-	-	-	0.34	(8.44)	-	-	-	6.43	-
H2SO4	0.70	-	1.77	-	-	-	-	-	-	-	-	0.01	0.68	-	-	-	0.05	-

Emissions *Change* by Month

Pollutant	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Post Jan 2019
NOx	-	23.95	-	-	-	3.05	-	-	-	-	-	-	-	-
SOx	-	2.83	-	-	-	5.85	-	-	-	-	-	-	-	-
CO	-	43.19	-	-	-	10.01	-	-	-	-	-	-	-	-
PM-10	-	10.51	-	-	-	3.24	-	-	-	-	-	-	-	-
TSP	-	10.51	-	-	-	3.24	-	-	-	-	-	-	-	-
H2SO4	-	0.12	-	-	-	1.10	-	-	-	-	-	-	-	-

***Cumulative* Project Emissions**

Pollutant	Contemporaneous Project	Aug 2016	Sep 2016	Oct 2016	Nov 2016	Dec 2016	Jan 2017	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017	Aug 2017	Sep 2017	Oct 2017	Nov 2017	Dec 2017
NOx	(14.86)	(14.86)	(2.78)	(2.78)	(2.78)	(2.78)	(2.78)	(2.78)	(2.78)	(2.78)	(2.78)	(1.69)	(69.29)	(69.29)	(69.29)	(69.29)	(61.44)	(61.44)
SOx	30.05	30.05	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.00	38.28	4.29	4.29	4.29	4.29	5.48	5.48
CO	(115.66)	(115.66)	(113.86)	(113.86)	(113.86)	(113.86)	(113.86)	(113.86)	(113.86)	(113.86)	(113.86)	(113.79)	(130.25)	(130.25)	(130.25)	(130.25)	(129.34)	(129.34)
PM-10	1.13	1.13	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	3.01	(5.43)	(5.43)	(5.43)	(5.43)	1.00	1.00
TSP	1.13	1.13	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	3.01	(5.43)	(5.43)	(5.43)	(5.43)	1.00	1.00
H2SO4	0.70	0.70	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.48	3.16	3.16	3.16	3.16	3.21	3.21

***Cumulative* Project Emissions**

Pollutant	Jan 2018	Feb 2018	Mar 2018	Apr 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Sep 2018	Oct 2018	Nov 2018	Dec 2018	Jan 2019	Post Jan 2019
NOx	(61.44)	(37.49)	(37.49)	(37.49)	(37.49)	(34.45)	(34.45)	(34.45)	(34.45)	(34.45)	(34.45)	(34.45)	(34.45)	(34.45)
SOx	5.48	8.31	8.31	8.31	8.31	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16	14.16
CO	(129.34)	(86.15)	(86.15)	(86.15)	(86.15)	(76.14)	(76.14)	(76.14)	(76.14)	(76.14)	(76.14)	(76.14)	(76.14)	(76.14)
PM-10	1.00	11.51	11.51	11.51	11.51	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75
TSP	1.00	11.51	11.51	11.51	11.51	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75
H2SO4	3.21	3.33	3.33	3.33	3.33	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43

Max Emissions Increase	PSD Applicability Threshold (TPY)	PSD Threshold Exceeded?
(1.69)	**40.0**	**No**
38.28	**40.0**	**No**
(76.14)	**100.0**	**No**
14.75	**15.0**	**No**
14.75	**25.0**	**No**
4.43	**7.0**	**No**

Notes

1) Estimated project completion date is based on the schedule provided in the CEQA Environmental Impact Report.

2) Note that the anticipated start date of the project schedule has already passed; however, the projected sequence of construction events remains unchanged and is maintained in this PSD applicability evaluation to demonstrate that PSD thresholds are not exceeded in any month during the project.

ATTACHMENT J

SUFURIC ACID REGENERATION PLANT (SARP) PROCESS VENT EMISSIONS

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment J: Sulfuric Acid Regeneration Plant (SARP) Process Vent Emissions
Facility: Wilmington

Sulfuric Acid Regeneration Plant:

Operating hours in year: 8760

Est Production Rate: 400 (tpd)

H2SO4 EF: 0.015 (lbs/ton produced)

Vent rate	16000	scfm
SO2 conc	400	ppmv
SO2 MW	64.06	lb/lb-mol
MVC	379.48	scf/lb-mol
Control eff.	**98%**	
SO2 emissions	1.30	lb/hr
	11,357	lb/yr
	5.7	tpy

H2SO4 Emissions:	6.00	(lbs/day)
H2SO4 Emissions:	1.10	(tpy)
H2SO4 Emissions:	0.25	(lbs/hr)
PM Emissions:	1.10	(tpy)

(assumes all H2SO4 is condensible PM-10)

* SO2 vent conditions are estimated and will be finalized upon final design of the SARP system. Vendor confirms the ability to comply with the 5.7 tpy SO2 emissions rate provided in this PSD analysis.
** H2SO4 EF based on vendor guarantee of performance.

Wed 10/19/2016 9:04 AM

BAILEY, KIRK W <Kirk-Wayne.Bailey@dupont.com>

Tesoro-Los Angeles Sulfuric Acid Regeneration Plant

To Mike Waller

Cc Christman, June M.; Shao, John

Mike-

I confirmed with the MECS Engineering Department, that the emissions limit requests (< 1 TPY mist, < 5.7 TPY SO2) from Tesoro for the proposed 400 STPD Carson spent acid regeneration facility are feasible and within the design capabilities of MECS based on the following criteria:

To meet the required emissions for Acid Mist and SO2, MECS would design a spent acid regeneration plant with the following characteristics:

- Dual Absorption Plant
- Advanced Catalyst Loadings
  - Maximize SO3 to SO2 conversion and limit the amount of SO2 reaching the tail gas scrubber
- Specific Design Criteria for Final Absorbing Tower with Mist Eliminators
  - Minimize acid mist formation
  - Minimize acid vapor concentration
- Tail Gas Scrubber with Mist Eliminators
  - Scrub the residual SO2 from the gas stream
  - Remove acid mist

Acid Mist Emissions

MECS has designed and guaranteed plants that meet the 0.015 pound of acid mist per ton of acid produced requirement.

SO2 Emissions

MECS has designed and guaranteed plants that meet the required emission concentration to achieve the < 5.7 TPY of SO2. There are MECS designed plants that currently operate at the SO2 concentration needed to achieve the total tons of SO2 emitted per year for the Tesoro proposed facility.

Thanks
Kirk

Kirk Bailey
Sales Manager, MECS Inc.

ATTACHMENT K

SULFURIC ACID MIST EMISSIONS FROM COMBUSTION HEATERS

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment K: Sulfuric Acid Mist Emissions from Combustion Heaters (Oil and Gas Journal Method)
Facility: Carson and Wilmington

Equipment Description	Fuel Type	2012 Reported H2SO4, lbs	2013 Reported H2SO4, lbs	Baseline H2SO4, lbs/yr	Post Mod SO2, lbs/yr	SO2 to SO3[1], mol%	Post Mod SO2, mol/yr	Post Mod SO3, mol/yr	SO2 to SO3[6] (SCR), wt%	SCR Add'l Post Mod SO3, mol/yr	Stack Temp, degF	Stack Moisture[2], %	Conversion of SO3 to H2SO4	Post Mod H2SO4[3], lbs/yr	PSD Increase H2SO4, lbs/yr	PSD Increase H2SO4, tpy	lbs/hr
Carson 51 Vacuum Unit Heater (D63) - Duty Bump to 360 MMBtu/Hr[4]	NG	-	-	55.27	1,802.06	2.54%	28	0.715	0.30%	0.068	344.26	16.39%	100%	76.7	21.4	0.01	0.0024469
Wilmington H-100 Heater - Duty Bump to 302.4 MMBtu/Hr	RFG	35.34	48.26	41.80	91,250.00	2.54%	1,426	36.302	0.30%	3.419	665.60	8.90%	100%	3,892.7	3,850.9	1.93	0.4395957
Carson NHDS Ultra-Low NOx Burner Installation (RW0053; D1433)[4]	NG	-	-	0.84	240.90	2.54%	4	0.096			600.08	12.14%	100%	9.4	8.5	0.00	0.0009741
Wilmington HCU Heaters H-300 and H-301 Duty Bump (Also install ULNB and SCR)[5]	RFG to NG	22.92	31.97	27.45	492.30	2.54%	8	0.196	0.30%	0.018	450.00	2.55%	100%	21.0	(6.4)	0.00	(0.0007359)
Wilmington H-101 Heater (D32)	RFG	183.44	224.61	204.03	16,402.21	2.54%	256	6.510			463.73	11.60%	100%	637.9	433.9	0.22	0.0495340
Wilmington H-30 Heater (D157)	RFG	0.83	1.20	1.02	2,781.55	2.54%	43	1.104			575.60	3.96%	100%	108.2	107.2	0.05	0.0122340
Wilmington H-21/H-22 Heater (D158)	RFG	0.03	0.04	0.04	2,042.64	2.54%	32	0.811			640.40	4.35%	100%	79.4	79.4	0.04	0.0090652
Wilmington H-510 Heater (D218)	RFG	1.03	1.52	1.28	3,871.75	2.54%	60	1.537			649.40	12.34%	100%	150.6	149.3	0.07	0.0170447
Wilmington H-501A, H-501B, H-502, H-503/504 Heater (D216, D217, D214 and D215)	RFG	108.00	162.00	135.00	8,841.14	2.54%	138	3.517	0.30%	0.331	300.20	9.73%	100%	377.2	242.2	0.12	0.0276434
Wilmington SRP H-1601/H-1602 Boilers (D76 and D77)	RFG	11.12	69.23	40.17	3,979.63	2.54%	62	1.579			344.30	15.30%	100%	154.8	114.6	0.06	0.0130831
Wilmington SRP Incinerators F-704 (C56)	RFG	2.20	3.15	2.68	11,800.66	2.54%	184	4.683			541.13	5.00%	100%	459.0	456.3	0.23	0.0520887
Wilmington SRP Incinerators F-754 (C54)	RFG	2.07	8.77	5.42	8,864.16	2.54%	139	3.518			602.33	4.90%	100%	344.8	339.3	0.17	0.0387375
Wilmington Boilers 7 and 8 (D722 and D723)	RFG	288.00	505.00	396.50	26,745.70	2.54%	418	10.615			500.00	9.11%	100%	1,040.2	643.7	0.32	0.0734864
Wilmington Boilers 9 and 10 (D724 and D725)	RFG	337.00	262.00	299.50	32,536.20	2.54%	508	12.913			500.00	12.00%	100%	1,265.5	966.0	0.48	0.1102688
Carson HC R-1 Heater (D625) - Affected Unit; No Physical Change	RFG	47.80	187.40	117.60	4,602.85	2.54%	72	1.827			521.28	13.78%	100%	179.0	61.4	0.03	0.0070116
Carson HC R-2 Heater (D627) - Affected Unit; No Physical Change	RFG	26.70	132.70	79.70	6,203.70	2.54%	97	2.462			586.99	13.74%	100%	241.3	161.6	0.08	0.0184458
Carson LHU Heater (D425) - Affected Unit; No Physical Change	RFG	14.90	17.00	15.95	1,133.31	2.54%	18	0.450			618.28	13.83%	100%	44.1	28.1	0.01	0.0032110
Carson FCCU Pre-Heater (D250)	RFG	164.10	171.30	167.70	7,408.68	3.58%	116	4.144			519.91	13.01%	100%	406.1	238.4	0.12	0.0272185
Wilmington Sulfuric Acid Plant Process Air Heater	NG	-	-	-	102.46	2.54%	2	0.041			450.00	12.90%	100%	4.0	4.0	0.00	0.0004549
Wilmington Sulfuric Acid Plant Decomposition Furnace	NG	-	-	-	215.16	2.54%	3	0.086	0.30%	0.008	180.00	12.90%	100%	9.2	9.2	0.00	0.0010478
Wilmington Sulfuric Acid Plant Converter Heater	NG	-	-	-	25.61	2.54%	0	0.010			450.00	12.90%	100%	1.0	1.0	0.00	0.0001137
		1,245.48	**1,826.16**	**1,591.93**	**231,342.65**		**3,614.73**			**3.84**				**9,501.94**	**7,910.02**	**3.96**	

Notes:
1. References: Delta Source Test dated March 18, 2003 conducted on the No. 3 Reformer Reaction Heater North Stack (1.5%).
   Delta Source Test dated April 11, 2007 conducted on the FCCU Preheater (3.58%).
   Other heaters based on the average of these results (1.5% + 3.58%)/2 = 2.54%)
2. Average moisture content from RATA test results.
3. Reference: Crane, Springer, Siegell, "New Method Estimates Sulfuric Acid Emissions from Fired Heaters," Oil and Gas Journal, September 30, 2002.
4. H2SO4 emissions unintentionally excluded from previous baseline calculations for the 51 Vacuum Unit and NHDS heaters. H2SO4 baseline emissions from these heaters are calculated and included here based on the Crane, Springer, Siegell method.
5. H2SO4 emissions decrease results from the conversion of this heater from refinery fuel gas to natural gas.
6. SO2 to SO3 conversion (wt%) based on vendor estimate for heater/SCR combinations and operating conditions at the Tesoro Los Angeles Refinery.
7. Per 40 CFR 60 Appendix A, Method 8, all SO3 is counted with H2SO4.

ATTACHMENT L

SUMMARY OF COKE HANDLING EMISSIONS INCREASES

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment L: Coke Handling Emissions (Increased Utilization)
Facility: Wilmington

Production	Projected Increase (Annual)
Tons of Delayed Coke:	**40,150**
MTons of Delayed Coke:	**40.15**
Number of Coke Trucks	**1,579**
Days per Year	**365**

Baseline Actual Emissions	2,825.50	lbs/year	2011-2012 AER
Projected Emissions	2,971.40	lbs/year	Baseline Emissions + Projected Incremental Emissions
Projected Emissions Increase	**145.90**	**lbs/year**	**Projected Emissions - Baseline Emissions**

LOADING/UNLOADING CONVEYOR EMISSION RATE

			Source/Comment
Loading/Unloading Conveyor Emission Rate, lbs/day = [(E_1 * PT * Thru) + (E_2 * VMT) + (E_3)] * Eff			
1. Loading of Coke onto Conveyors			
13.2.4 Aggregrate Handling & Storage Piles, AP-42 11/2006			
E_1 (lb/ton) = Load In/Out Factor = k_L (0.0032) x (WS/5)^1.3 / (M/2)^1.4	0.000148	lbs/ton	Calculated
k_L = particle size multiplier	0.35		AP-42, Table "Aerodynamic Particle Size Multiplier (k)", 13.2.4-4
WS = mean wind speed	6.36	mph	Meteorological data for Long Beach from TANKS 4.0
M = material moisture content	10.62	%	See tab Coke Analysis
PT = Number of Pile Transfers =	10		
Thru = Daily Facility Throughput =	110	tons/day	Operating Data
Emissions = 0.16 lbs/day			
Eff = Efficiency of Fugitive Dust Controls =	0.95		Enclosure and Waterspray, See reference (1), App. C, pg C-2 (transfer drops)
Loading Conveyor Emission Rate (uncontrolled) =	0.16	lbs/day	Calculated
Loading Conveyor Emission Rate (controlled) =	**0.01**	lbs/day	Calculated
	2.97	lbs/yr	

TRUCK LOADING EMISSION RATE

Loading/Unloading Emission Rate, lbs/day = [E_5 x Thru] x Eff			
5. Coke Loading onto Trucks			
13.2.4 Aggregrate Handling & Storage Piles, AP-42 11/2006			
E_5 (lb/ton) = Load In/Out Factor = k_L (0.0032) x (WS/5)^1.3 / (M/2)^1.4	0.000148	lbs/ton	Calculated
k_L = particle size multiplier	0.35		"Aerodynamic Particle Size Multiplier (k)" table, 13.2.4-4
WS = mean wind speed	6.36	mph	Meteorological data for Long Beach from TANKS 4.0
M = material moisture content	10.62	%	
Thru = Daily Facility Throughput =	110	tons/day	Operating Data
Eff = Efficiency of Fugitive Dust Controls =	0.95		Enclosure and waterspray, See reference (1), page 121 (transfer drops)
Emissions = 0.02 lbs/day			
Truck Loading Emission Rate (uncontrolled) =	0.02	lbs/day	Calculated
Truck Loading Emission Rate (controlled) =	**0.00**	lbs/day	Calculated
	0.30	lbs/yr	

TRANSPORT EMISSION RATE - WIND EROSION

6. Wind Erosion of Pile Surfaces within Transport Truck			
13.2.5 Industrial Wind Erosion, AP-42 11/2006			
$E_6 = k_E \sum P_i$			
k_E = Particle Size Multiplier	0.5		AP-42, Section 13.2.5, pg 13.2.5-3
$\sum$ = Sum from 1 to N, where N = # of surface disturbances per year	1,579	# / year	Assumed one disturbance per truck truck leaving the facility
P_i = erosion potential corresponding to the observed (or probable) fastest mile of wind for the ith period between disturbances, g/m2			
Using Procedure outlines in AP-42, Section 13.2.5, pg 13.2.5-8			
Step 1: Determine threshold friction velocity for erodible material of interest			
u_t = threshold friction velocity (m/s)	0.55	m/s	AP-42, Section 13.2.5, Table 13.2.5-2
Step 2: Divide the exposed surface area into subareas of constant frequency of disturbance (N).			
Step 3: Tabulate fastest mile values (u^+) for each frequency of disturbance and correct them to 10 m (u^+) using Equation 5.5			
$u_{10}^+ = u^+$ (wind speed) + u_{truck} (truck speed)	u^+ = 6.6	m/s	Review of SCAQMD met modeling data for Long Beach shows
	u_{truck} = 4.47	m/s	99th percent wind speed to be 15 miles/hr or 6.6 m/s. Data is
	u_{10}^+ = 11.07	m/s	already at 10 meters, therefore no adjustment necessary.
			Speed limit is 10 mph along the paved road out of refinery
Step 4: Convert fastest mile values (u_{10}) to equivalent friction velocities (u*), taking into account (a) the uniform wind exposure of nonelevated surfaces, using Eq. 4, or (b) the nonuniform wind exposure of elevated surfaces (piles), using Eq. 6 and 7.			
From Table 13.2.5-4, using u_{10}^+ = 11.07			
$u^*(u_s/u_t=0.2)$ = 0.22			
$u^*(u_s/u_t=0.6)$ = 0.66			
$u^*(u_s/u_t=0.9)$ = 1.00			
$u^*(u_s/u_t=1.1)$ = 1.22			
Step 5: For elevated surfaces (piles), subdivide areas of constant N into subareas of constant u* (i. e., within the isopleth values of u_s/u_t in Figure 13.2.5-2 and Table 13.2.5-3) and determine the size of each subarea.			AP-42, Section 13.2.5, Figure 13.2.5-2, Pile B3
Each truck pulls two identical trailers. The surface area for a pile is based on the dimensions of the trailer.			
A = Length * Width			
Area of pile = 12096 in^2			
Total Area = 15.61 m^2			

Pile Subarea	Percent	Area (m^2)
0.2a	3%	0.47
0.2b	25%	3.90
0.6a	28%	4.37
0.6b	26%	4.06
0.9	14%	2.19
1.1	4%	0.62

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment L: Coke Handling Emissions (Increased Utilization)
Facility: Wilmington

Step 6: For each subarea of constant N and u*, calculate the erosion potential (P_i) using Eq. 3				
$P_i = 58(u^* - u_t)^2 + 25(u^* - u_t)$				
$P_i = 0$ for $u^* \leq u_t$ (for 15 miles/hr, $u^* < u_t^*$ for pile subareas 0.2a and 0.2b. Therefore, only three P_i are calculated)				
u^* = friction velocity (m/s)				See below
u_t = threshold friction velocity (m/s)			0.55	m/s AP-42, Section 13.2.5, Table 13.2.5-2
$P_i = P_{0.6}$ =	3.452	g/m^2		
$P_i = P_{0.9}$ =	22.995	g/m^2		
$P_i = P_{1.1}$ =	42.7862	g/m^2		
Step 7: Multiply the resulting emission factor for each subarea by the size of the subarea, and add the emission contributions of all subareas.				
P (lbs) =	106	g		
Emissions (E_e) =	184.53	lbs/yr		
Emissions (E_e) =	**0.51**	**lbs/day**		
Eff = Efficiency of Fugitive Dust Controls =			0.85	Slot Tops, See reference (1), page 123
Wind Erosion Emission Rate (uncontrolled) =			0.51 lbs/day	Calculated
Wind Erosion Emission Rate (controlled) =			**0.08** lbs/day	Calculated
			27.68 lbs/yr	

TRANSPORT EMISSION RATE - TRAVEL ON PAVED ROADS

7. Coke track out (inside facility on paved road)			
13.2.1 Paved Roads, AP-42 11/2006			
Transport Emission Rate, lbs/day = (k x s x WF x Vehicle x VMT / days) x Eff			Based on AP-42, Section 13.2.1, Eq. 1
k = Particle Size Multiplier =	0.016	lb/VMT	See reference (1), page 125
s = Silt Factor = (Baseline SL/2)^0.65	1.38		Calculated
Baseline SL =	3.28	g/m^2	See reference (1), page 125
WF = Vehicle Factor = (W/3)^1.5	28.6		Calculated
W = mean vehicle weight =	28.1	tons	See reference (1), page 126
Vehicle = Number of Vehicles per year =	1579		Calculated using truck logs, see tab 'Truck Loading'
VMT = Vehicle Miles Traveled =	0.31	miles	Est. 0.31 miles for paved road from loading to outside facility
Eff = Efficiency of Fugitive Dust Controls = Controlled SL =	0.25	g/m^2	Spray Roads, See reference (1), page 126
s = Silt Factor = (Controlled SL/2)^0.65 =	0.26		Calculated
Transport Emission Rate (uncontrolled) =	1.68	lbs/day	Calculated
Transport Emission Rate (controlled) =	**0.31**	lbs/day	Calculated
	114.96	lbs/yr	

Reference Documents:

(1) Jones, D., C. Tupac, R. Lem, "Proposed Amended Rule 1158 - Storage, Handling and Transport of Coke, Coal and Sulfur," South Coast Air Quality Management District, March 12, 1999.